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THERE is a certain monotony about the accounts of the burning of city factories. So many of them have been destroyed, and so many lives lost in them, that we are able to predict with tolerable certainty the modes in which the buildings will take fire, the course of the flames, the character of the frantic efforts which the imprisoned operatives will make to save themselves, and their fate. The last example, differing in some respects from the ordinary ones, occurred in Cincinnati, where a printing-office took fire, and, although the building was saved with little damage, fifteen persons lost their lives within as many minutes after the fire began. The immediate cause of the catastrophe was the explosion of a can of benzine in the second story of the printing-office. As usual, the flames immediately darted up the elevator-shaft to the top story, where a large number of girls were employed in folding. The only staircase to this story was built around the elevator-shaft, separated from it by an open wooden lattice, which of course caught fire like tinder, making the stairs impassable. One brave man, John Sullivan, whose name deserves long remembrance, ran up the stairs at the first alarm, to warn the helpless girls, but he had hardly reached the top of the staircase before it blazed up behind him, cutting off his retreat. Without troubling himself about this circumstance, he set himself to saving the lives of those whom he had come to warn. Four of the girls had already jumped from the window, and were lying, dead or maimed, on the sidewalk below, but the occupants of the adjoining building had been sensible enough to carry a long rope to the roof, which they lowered within reach of a window in the room where the poor wretches were imprisoned. Sullivan caught the rope, and tied one of the girls to it, and the men on the roof lowered her safely to the sidewalk, and drew it up again. Another girl was lowered in the same way, but the room was by this time so full of smoke that respiration was impossible, and when the rope was pulled up for the third time Sullivan was the only person left alive there. He tied the rope about himself, and was lowered a part of the way, when a tongue of flame issued from a window above him, and struck the rope, burning it off; and he fell, striking his head on the sidewalk, and dying instantly. By this time the engines had arrived, and the fire was so soon under control that in fifteen minutes after the call for help was given the chief engineer was able to ascend, by the still serviceable stairs, to the upper story, where ten young girls lay dead upon the floor and on the tables. Above them was an open scuttle, by which they could easily have escaped over the roof to the adjoining buildings, if they could have reached it; but there was no ladder, and they were too much terrified to build steps of tables and benches, even if they could have seen well enough through the blinding smoke to do so within the few minutes that life remained to them.

THE New York *Graphic* tells an interesting story about the life of Mr. F. A. Peterson, an architect well known among the older members of the profession, who died in New Jersey a few days ago. Mr. Peterson, according to the account, was born in Prussia in 1808, and was educated for the army. While stationed, as a lieutenant of engineers, on the staff of the general commanding the Dantzic district, an inundation took place, and Lieutenant Peterson was sent to the spot to render what assistance he could. He found the water rising rapidly, and a small town in momentary danger of being overwhelmed. A dyke protected the town from the sea, and on comparing the relative levels on each side of the dyke, he ascertained that by cutting the dyke the water of the inundation would escape safely into the sea. Without waiting to make further inquiries, the young engineer ordered this to be done, and in a few hours the flood had been safely drained away. The inundated ground had, however, been hardly dried by the sun before the ungrateful inhabitants of the town which the energetic young officer had saved brought suit against the Government for damages for the cutting of their dyke, claiming a hundred thousand thalers as compensation, under an old law which, for the protection of the dykes, had made it a crime, punishable with the cutting off of the right hand of the offender, as well as with the payment of pecuniary indemnity, to make a breach in them. A military commission was sent to inquire into the matter, and found that the law had never been repealed, and that no exception was made in it in favor of cases of necessity; and it therefore recommended that the indemnity should be paid. The villagers were good enough not to demand that the hand of the man who had saved their lives and property should be chopped off, and the military commission having warmly praised his energy and skill, he was promoted, and soon afterwards was attached to the royal staff. While holding this position he was sent repeatedly to England, and there imbibed notions of popular government, which finally led him to an avowed sympathy with the revolutionists of 1848, and he was arrested, and thrown into prison to await trial. Fortunately, with the help of his wife and a few friends, he managed to escape from prison, and gained the shelter of an American ship, which brought him to New York. Here he began business as a civil engineer and architect, and was entrusted with many commissions of considerable importance, his best-known building being perhaps the Cooper Institute, at the junction of Third and Fourth Avenues and the Bowery.

THE telegraph brings news of the death of Théodore Ballu, one of the most distinguished of French architects. According to the dictionaries of contemporaneous biography, on which we must rely for information until further details come to hand, M. Ballu was born in Paris in 1817, and entered the School of Fine Arts in 1835. After five years in the school he won the Prize of Rome, and on his return from his five years of study in Italy and Greece, was appointed inspector of works at the church of Sainte Clothilde, and was for many years connected with that building. Like Viollet-le-Duc, he was an archæologist and restorer as well as an architect, and distinguished himself by his restorations of the curious transition church of Saint Germain l'Auxerrois, and the tower of Saint Jacques la Boucherie. His principal original works were the churches of la Trinité and St. Ambroise, and the new Hôtel de Ville of Paris, which, in association with M. Deperthes, he rebuilt upon the ancient site, and very nearly in the original style. After the death of Viollet-le-Duc in 1874, he was chosen to fill his place as Inspector of Diocesan Buildings, and continued to enjoy the highest favor with the Government to the end of his life. In the profession he was greatly esteemed, and in 1872 was elected to the Academy.

LE GENIE CIVIL gives a curious account of the work for the foundation of the great church of the Sacred Heart at Montmartre. This church, the design of which is due to the late M. Abadie, who was selected as architect in the memorable competition of 1874, stands on a gravelly hill in the suburbs of Paris, and the construction being intended to be very solid it was necessary to take special pains to secure a substantial foundation. The preliminary excavations showed that the upper stratum of soil on the hill consisted of sand, to a depth of about thirty feet, but it was not considered safe to place the building on this, and trial pits were sunk at different points, which showed that the sand rested on successive layers of clay and gravel, extending far below the surface, and reposing at last on a compact mass of gypsum rock. Although the rock was one hundred and fourteen feet below the surface, it was deemed imprudent to trust the weight of the huge, stone-roofed church on any of the strata above it, and the entire foundation was therefore carried down to this great depth. The plan of the building, like that of most stone-vaulted churches, presenting

a series of piers, carrying most of the weights, with nothing but thin curtain-walls between, it was only necessary to build the piers up the whole distance from the rock, leaving the curtain-walls to be carried by arches turned between the foundation-piers a little below the ground. The whole number of piers built up from the rock was eighty-three, the size on plan varying from ten to seventeen feet square. Before commencing the masonry, a drill-hole was sunk to a depth of twenty-two feet in the rock below each pier, to see whether galleries from any of the numerous gypsum mines in the neighborhood had been run under it, but the rock proving sound everywhere, the piers were built directly upon it, of rubble stone-work, the first six feet being laid in cement, and the rest in hydraulic lime. The whole amount of stone-work laid in the piers was about one and one-quarter million cubic feet, and just below the floor of the crypt all the piers were connected with arches and vaults, upon which the pavement of the crypt was laid, and the superstructure was then commenced upon the foundation so secured. The work above ground has proceeded rapidly, and the crypt is now completed, and the walls of the upper church so far advanced as to permit the western porch to be vaulted and covered with its stone roof-tiles, and the apsidal chapels to be terminated, with the exception of the Lady Chapel, which is to be carried up into a high tower. Since M. Abadie's death M. Daumet has directed the execution of his design, and M. Raulin, whom some of our younger readers will remember as a fellow-student with them in Paris, has had charge of the work on the ground.

A BRIDGE of concrete, thirty-three feet in span, and carrying a roadway thirteen feet wide, and capable of supporting safely a load of two hundred tons, was recently built in Switzerland in a single day, under the direction of Professor Tetmaier of Zurich. According to *Le Génie Civil*, the bridge was a single arch, of segmental profile, rising six feet and a half from springing to crown, and twenty inches thick at the crown, and forty at the springing, with abutments ten feet thick. The concrete used for the arch was composed of one part cement, mixed dry with two parts sand, and the whole then mixed with four parts of gravel, and water enough to cause a light sweating as the concrete set. For the abutments, three parts of sand and seven of gravel were used to one of cement. All the materials were made ready beforehand, and at six o'clock in the morning the construction of the abutments was begun. As soon as these were brought to the proper height, the centre was set in place, and the arch turned, and tympanum walls built up on each face of the arch, to the level of the roadway. Gravel was then filled in over the arch, between the tympanum walls, to the roadway level, and the bridge was pronounced finished, the whole work having been completed in twelve hours, at a cost of six hundred and four dollars, including the expense of an iron railing on each side. It would have been foolish to permit vehicles to pass over the bridge at once, and two months were allowed for the hardening of the concrete, after which a heavy traffic immediately began, without any apparent injury to the construction.

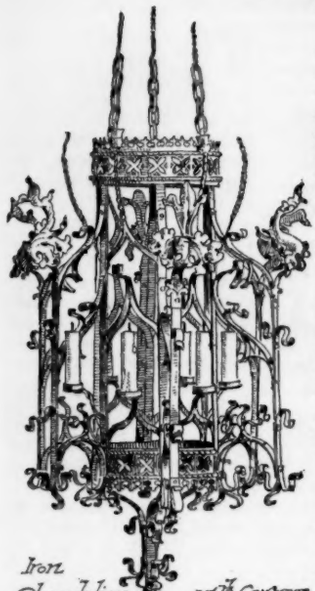
THOSE persons who live near great iron-works, and who wish to build substantial but cheap structures, may derive useful suggestions from a paper read before the French Société Centrale des Architectes, upon concrete construction, as practised at Lyons, with cinders for the aggregate. The first experiments in the use of this material were made about thirty years ago by some builders who had hired land by the river-bank, and wished to find a material for their walls as cheap as the *pisé*, or consolidated loam, which is much used in Southern France for low structures, but less liable to washing away in case the river should overflow its banks. At that time coal cinders were a waste product in Lyons, as they still are in many towns, and the proprietors of the foundries were glad to give them away, either for nothing or at a price of a cent or so a cubic foot. The surface of the cinders is so rough as to adhere strongly to any concreting substance, and even with pure lime, in the proportion of one part lime to four of cinders, a concrete was obtained which presented a considerable resistance, and with hydraulic lime a very efficient concrete was produced. The success of the first experiments attracted attention, and the new concrete soon came into extensive use for walls, which could be made of it, so long as cinders could be had for the asking, at a cost of less than three cents a cubic foot. By the substitution of hydraulic lime for the common sort in the concrete, its quality was greatly improved, and walls were built of it eighteen or twenty inches thick, which carried several tiers of beams safely.

THE good quality of the material in simple constructions being thus shown, some architects of the city ventured to employ it under more trying circumstances, first, however, subjecting it to thorough tests. In one of these cases M. Louvier, the architect of the new Prefecture in the city, resolved, if it should prove suitable, to use it for the whole of the vaulted ceiling over the cellar of his building. To try its resistance in such a situation, he had a barrel-vault made of it, twenty feet in span, and rising about four feet from the springing to the crown. The thickness of the vault was eighteen inches, and what thrust it might have was resisted by piling up earth against the low stone walls on which the vault rested. Three weeks after the vault was finished it was loaded with a distributed load of five hundred pounds to the superficial foot. This load was left on it for two weeks, without producing any settlement or rupture of any kind. The distributed load was then removed, and a weight of twelve hundred pounds was let fall, from a height of something over three feet, upon the middle of the vault. This shock produced no injurious effect; and a third test was made, to try the resistance of the concrete to fire. This was done to remove the apprehensions of a member of the municipal council, who thought that the cinders would make the mass combustible. A bar of iron, two and one-half inches square, was fastened under the soffit of the vault, and a movable forge was so placed that the blast could be directed upon it. The forge was then lighted, and the iron bar, with the concrete about it, kept at a "red-white" heat for half an hour. After it had cooled no effect could be perceived from the flame except a superficial calcination of the concrete; and a load of six thousand pounds was then placed on the top of the vault, which endured it without the least fracture or yielding. The extraordinary capacity of cinder-concrete for resisting fire is well known in this country, but it is interesting to find such confirmation as this of the American opinion of its good qualities. In fact, it is said that a manufactory of nitro-benzol, in the suburbs of Lyons, which had walls of cinder-concrete, took fire, and burned so furiously that the machinery was partially melted. The walls were vitrified in places by the heat, but were otherwise uninjured, and the new floors and roof were, in rebuilding, put in the same places that the old ones had occupied.

AN exhibition of process and manufactured goods, carried on by private enterprise, is to be held in Paris this year, in the Palais d'Industrie. Although a small affair in comparison with the great Exposition of 1889, it is likely to have, like most well-managed small exhibitions, an interest of its own, and as the building in which it is to be held is near the Tuileries, and therefore quite centrally situated, it is likely to attract many casual visitors. The space is limited, and as the affair is not a public one, a charge is made for space, installation and representation, which will probably restrict the number of foreign exhibitors very materially, as those only are likely to incur the cost of exhibiting who are sure of being reimbursed through the advantage afforded by the opportunity of introducing their goods to the public on the other side of the ocean. If any such should happen to be among our readers, we may save them trouble by saying that Mr. Jacob Sommer, 13 Laight Street, New York, is the proper person to apply to for further information; and any others who are likely to be in Paris between the twenty-third of July and the twenty-third of November will do well to remember that an interesting exhibition will, between those dates, be in progress in a very pleasant and accessible quarter of the city.

WE do not doubt that many of our readers, particularly those who practise far from the great cities, will be glad to know the method of preparing the tracing-paper which they find so indispensable to their work. According to the *Scientific American*, nothing more is necessary than to lay sheets of tissue-paper on a flat board or table, and sponge them on one side with a solution of two pints of Canada balsam in three pints of spirits of turpentine, to which a few drops of old nut oil have been added. The paper, after treatment, is to be hung up to dry, over two cords, stretched eight inches apart, and finally rolled up on rollers covered with paper. When the composition has dried so as to be no longer sticky, the paper is ready for use.

RECENT BOOKS ON ART.



Iron Chandelier. 15th Century. National Museum, Germany.

A POINT of view which is not moral, literary, or vaguely "æsthetic," but is primarily artistic, looking at art as art, and at painting as painting; a sympathy which takes in not only the old masters and modern English art, but modern Continental art as well; and a style which is clear, precise and lucid — these are qualities we have only of late years learned to expect in criticism that comes from an English hand, qualities we have felt to be rather French than British. To-day, however, there are many English writers who exhibit them, and among these writers Mr. Carr holds one of the foremost places. And his criticism is apt to show, in addition, a deep feeling (sometimes missing from current French work) for those intellectual, poetic, spiritual factors which should underlie painting, although they cannot *make* painting. It is no easy task to hold the balance true between what is spiritual in art and what is technical — or rather, to weigh both together, with justice and appreciation; but it is a task within Mr. Carr's ability, and the only regret his book[1] inspires is that, with its large print and wide margins, it offers us a more slender meal than we had anticipated from our first glance at its covers. The two chapters on Reynolds and Gainsborough are written with such keen insight and delicate skill of expression that they are very valuable, in spite of the well-worn nature of their themes. And we have an unusual degree of confidence in their decisions, because, as I have implied, no one can accuse this admirer of being insular in his admirations.

The greatest worth of the book lies, I should say, in the sketch it gives in these two essays — in one on James Barry, and in one on Rossetti — of the general course of English art. The sketch is slight and is incidental to the titular subject-matter, but its clearness and breadth are only the more remarkable, and they prove that, in studying any special artist, Mr. Carr studies him, not (as is too often done) as a figure of isolated interest, but as part and parcel of a wider whole. No surer test than this, I think, can be applied if we would estimate the value of a critic's judgments.

A fifth chapter, the longest of all, is devoted to a collection of drawings by the old masters. Here again the insight is keen, the temper is catholic, and the words are excellently well chosen. But we note in one or two places that Mr. Carr either does not know or does not accept the latest decisions of German criticism — that criticism which is so valuable as to facts of origin and authenticity, although often much less valuable as to other matters. For instance, Mr. Carr refers to the famous sketch-book at Venice as authoritative with regard to the parentage of other drawings attributed to Raphael. But many German students (led by Morelli, who is an Italian, but who writes in German, under the pseudonym of Lermolieff) now believe the drawings of the sketch-book to be chiefly Pinturicchio's, and but two of them to be Raphael's. Only doctors are privileged even to disagree upon such questions. But it is certain that the internal evidence to which Lermolieff appeals is the sole evidence which can be accepted in deciding upon the authorship of the sketch-book, and, in consequence, of numerous other drawings and paintings which were made either by Raphael or by his fellow-workers. Its extrinsic claims to Raphael's authorship are so very slight that the only wonder is that the discussion which now has been started should not have been started long ago. The proven pedigree of the book goes back much less than a century; the owner who revealed it to the public christened it in a first burst of uncritical enthusiasm, and neither he nor any one else seems to have reconsidered the matter until Lermolieff came upon the scene a few years ago. His book ("*The Works of the Italian Masters in the Galleries of Munich, Dresden and Berlin*") is much broader in its scope than its title implies. It has been successfully revolutionary upon many very interesting and important points, and I think the point with regard to the Venetian sketch-book is now pretty generally included in the list.

This little book,[2] one of the latest issues in the excellent "*Bibliothèque de L'Enseignment des Beaux Arts*," well meets a want that ought to be very widely felt. The larger portion of what is really practical and instructive in the way of art criticism, and especially of the criticism of architectural art, must remain a sealed book to those who do not read French. So true is this that I cannot conceive of any acquirement more essential to an earnest student than the acquirement of French. After the first steps have been taken, a prime necessity will be a dictionary giving clear explanations of technical and semi-technical terms. This is what we now have in M. Adeline's volume, and, fortunately, in a very portable form and at a very cheap price, four francs fifty centimes. Intended for French students, its explanations are of course in French; but for this reason they are more sure to be trustworthy than are those in French-English lexicons, and the educational value of the book will be all the greater to the student. If his comprehension remains at fault, moreover, he will almost certainly be helped out by an illustration, for the entries, which number about five thousand five hundred, are accompanied by no less than fourteen hundred cuts. These cuts are very small, but in general very business-like and clear and very well selected.

It is not often left for a foreigner to decide whether or no there are mistakes in the text, but even a foreigner can decide whether there are omissions or shortcomings. I have searched for such with the conscientious eye of a reviewer. To say that I have found some is merely to repeat what we all know, that there never has been and never will be a dictionary, lexicon, encyclopædia, or book of reference of any kind which even the least conscientious of reviewers could call perfect. But as the standard in such things goes, M. Adeline's book seems to me to deserve great praise. In short, I can hardly recommend it strongly enough to my readers, for I know of none other whatsoever which (especially when we remember price and size) could be cited as a rival. I may add that a wise latitude has been allowed in the choice of subject-matter; not only the main arts but all the handicrafts find a place, and such accessory sciences as, for example, photography, anatomy, and heraldry. Nor are the explanations simply etymological. They are briefly and crisply, but very instructively critical and historical as well. Once, at least, I have also found a bit of hopeful prophecy, as may be read in the following translation of the paragraph that stands under the heading "*Lighthouse:* — Used of those towers, turrets, or tall, slender structures which are erected on the seacoast or on the shores of wide rivers, and bear upon their summits lights for the guidance of the navigator. At the entrance of the ports constructed by the Romans there were often towers serving as lighthouses, and built in imitation of that celebrated *Pharos* of Alexandria, which, recalling the apothesis-pyre, was formed of truncated pyramids placed in retreat, one above the other. Sometimes, again, colossal figures are used as lighthouses. Such was the Colossus of Rhodes, and such will be, in America, the statue of Independence (*sic*) by Bartholdi, executed in *repoussé* bronze; its highest point being destined to receive a beacon."

Few, indeed, of all the very many recent writers upon art have deserved so large a meed of gratitude as Charles Blanc.[3] The field he covered was very wide, and he brought to its survey theories which were consistent and logical from end to end, yet were preserved from narrowness by his widely sympathetic nature, and from vagueness by his intense appreciation for the technical side of art. That is to say, his writing combines to a most unusual degree the qualities of good art-philosophy and of good art-criticism. Moreover, he wrote with a distinct educational aim in view, and his works have thus a peculiar value to the student as opposed to the mere lover of art or of literature. The lover of literature too, however, must hold Charles Blanc in peculiar honor, for there is little writing, even in that language which is peculiarly rich in such, that as writing proper is more admirable than his, more forcible, more finished, or more exquisite. To the student his "*Arts du Dessin*" and his "*Arts Décoratifs*" are absolutely indispensable manuals. And it is well when their teachings can be supplemented by a knowledge of that great work on the painters of all ages, in which Charles Blanc was helped by other pens, though the guidance of the whole scheme and much the larger portion of the text remained in his own hands. But even the student who owns and reads and values these books will be helped by a perusal of the volume here under consideration. It notes the main facts of the great critic's life without any pretence to biographical completeness, but yet in a way which makes us acquainted with a charming personality, and affords an inspiring lesson as to how an earnest worker may regulate his existence, conceive of his task and pursue his aims with a single-mindedness, a devotion, and a self-sacrificing enthusiasm that cannot be overpraised. And it gives an analysis of his views upon each department of art as they are set forth in his voluminous pages: an analysis which is a most valuable guide either to prepare one for the books themselves or to systematize their contents in the memory after they have been read. Not less instructive and with more of essential novelty is the chapter which reviews the course of French criticism previous to Charles Blanc's day.

The introduction consists of an estimate of Charles Blanc's writings, and of his services as a teacher, which first took shape as the inaugural address delivered by M. Eugène Guillaume to the students of the College de France, when he was appointed to fill the chair of æsthetics left vacant by the death of Blanc. The foundation of this chair, I may note, was largely due to the energy of Charles Blanc himself, and it is not one of the least of the benefits for which art is indebted to her great critic.

Every one knows how very much has been written by Frenchmen

[1] *Papers on Art.* By J. Comyns Carr. London: Macmillan, 1885.

[2] "*Lexique des Termes d'Art*," *par Jules Adeline.* Paris: Quantin.

[3] "*Charles Blanc et son Œuvre*," *par Tullo Massarani. Avec une Introduction par Eugène Guillaume.* Paris: Rothschild, 1885.

about the art of modern France; yet one might be at a loss where to turn for a compact and consecutive treatise which should present the whole story in a clear and impartial light. I think, in fact, that no volume exists in French or English which quite holds the place held by the new German book[1] I cite. Several similar books exist in the same language, but none of them is to be compared to this in width and minuteness of knowledge, or in lack of Teutonic prejudice, of Teutonic philosophico-æsthetic theorizing, and of Teutonic infelicities in arrangement and in style. In these latter points, and indeed in all points, the author seems to me to show that he has studied to good advantage the writers as well as the artists of France.

This volume is but the first of a series which is to tell the story of modern art in every country; but it is complete in itself, so complete and so excellent that I cannot but hope it may find a competent translator. I think it would have a wide welcome in America. It offers a very full account of all departments of French art, from the Revolution — which makes, of course, a very logical point of departure — up, literally, to the present day. If the chapters on architecture and on sculpture are less full and less entirely satisfactory than those on painting, we may remember that in painting the public always takes the greatest interest. And it is for the public and not specially for students that our author writes — not for the outer public, that is to say, which reads merely to be amused, but for the inner public, for those art-lovers who stand between the student on the one hand and the indifferent outsider on the other.

The way in which biographical is combined with critical material seems to me peculiarly admirable. Not only is a due balance held between the two in general, but great good judgment is shown as to whether much or little that is biographical shall be given in each individual case. When an artist's life has not stood in very vital relation to its artistic outcome, then but little is said about it; but when, as with David, or with Delacroix, or with Millet the connection has been intimate and controlling, then it is explained at length and in a very sympathetic and charming way. Even though we may have read biographies and monographs in plenty, we shall find the image of many an artist impressed more clearly on our minds after reading these intelligent surveys.

Yet, after all, the main value of the work lies in the clearness with which the tangled threads of the general history of the development have been unravelled and made plain before our eyes — in the tracing of those many influences which have been at work, harmoniously or discordantly, for a century past, in the characterization of those great tendencies, classic, romantic, naturalistic, realistic and impressionist. I cannot, I think, give too much praise to the manner in which Herr Rosenberg explains these tendencies, not only in their results, but in the forces which gave them birth, and not only in portraying those artists in whom one or the other found its extremest expression, but also — a much more difficult task — in portraying those in whom two or more met and expressed themselves together. So much impartiality united with so much real interest in the subject, so much appreciation for actual results united with so much sympathy for intentions, and understanding of necessary limitations, are qualities we do not often meet with in similar commentaries. The art of France is not conceived of as an independent, isolated development, but as one bound up with the current history of the people; and yet the error is not made of denying their just rôle to personal force of character and the bent of individual endowment.

The only fault I can find with the volume — and I dare say it will seem not a fault but a virtue to the majority of readers — is that too little attention is paid to the technical side of art. I do not mean that the character of an artist's painting is not dwelt upon in most of its factors; color, composition, drawing, subject-matter, sentiment — all these are fully and understandingly and instructively discussed, but an artist's technique as such — his manual style, his *handling* — is, to my taste, too much neglected.

I will say, in conclusion, that the many references Herr Rosenberg gives in his foot-notes add very materially to the value of his book. By their aid the student may pursue still further any special subject to which he is attracted; and taken together they form a list of the most valuable criticisms which have hitherto appeared upon the art of modern France.

M. G. van Rensselaer.

The Rape of the Church. — In Wickford, R. I., is what is claimed to be the oldest Episcopal church in America. It was built in 1707, and was once stolen and transported a distance of seven miles. It was originally built on what was then called McSparren Hill, but in the course of seventy-five years the population had changed so that most of the worshippers came from Wickford, seven miles away. The proposition to remove the church was first made at a vestry meeting, but was so bitterly opposed by the few members who yet remained on McSparren Hill that the Wickford faction resolved on a *coup d'état*. The road from where the church stood to Wickford was all down hill. They mustered their forces one evening, collected all the oxen in the vicinity, placed the house on wheels, and while the opposing faction were soundly sleeping in their beds, hauled the holy edifice to the spot where it now stands, and where it has since remained. As it was utterly impossible to move the house back up the hill again, the surprised hill residents could only vent their rage in unchurchly language. Although the old building is still standing, the present society worship in a more modern edifice. — *Boston Transcript.*

[1] "*Geschichte der Französischen Kunst von 1789 bis zur Gegenwart*," *Von Adolph Rosenberg*. Leipzig: Grunow, 1884.]

RENDERING WOOD FOR BUILDING PURPOSES NON-INFLAMMABLE.[2] — I.

Old Furniture at the Soldiers' Carnival Boston, Mass., April 1887.

THE rendering of wood for house construction non-inflammable should be a subject of great interest to all. There is, however, little information obtainable from published works. The Japanese light structure is perhaps a necessary evil, but also has its advantages, and the Japanese would probably be unwilling, either from conservative feelings or from a question of expense, to build more costly, durable and fire-proof houses. Let us see, then, how these wooden buildings may be preserved from destruction by fire, though the cost in the more thorough processes may be possibly sufficient to preclude their use among those whose poverty is the reason for their not building more durable houses.

Secondly, it must be remembered that an individual house, though it would not burn by itself, yet if surrounded by a conflagration of the adjacent buildings would smoulder away, though it would not burst into flame. Hence it is necessary that a block or small number of prepared houses should be together, in which case only those nearest to the advancing fire would be damaged and all the rest remain intact. This might be done by Government order, private agreement amongst themselves, or a fire insurance company, who would take insurance on any block so prepared at moderate rates.

Let us then proceed to pass the various processes in review, with their advantages and disadvantages fully set out, and with their capabilities for preserving fabrics as well as timber from fire. Should it be decided to impregnate the wood with chemicals, this can be done, or a superficial coating of fire-proof and water-proof paint over the wood may be put on, or both; but the Japanese do not paint their wood much, and might not care to do so. In either case it would be necessary to use a preservative, which, in places exposed to rain or washing, would not wash out. How far those non-inflammable salts which unite chemically with the albuminous and nitrogenous matter in the wood are capable of resisting wet it is difficult to say with certainty; but there are some which we shall proceed to give further on which do effectually resist water and soap.

Again it must be a *sine quâ non* that, whatever the fire-proofing material used may be, it must be one which, when exposed to the action of fire, does not give off injurious or suffocating smoke. Also, if the impregnation of the timber is to be thorough, *i. e.*, through the whole of the wood, it would be most advantageously done whilst the wood is green and the sap uncongealed; otherwise the tubes become clogged, and the injection of the chemicals only extends to a certain depth in the wood if the latter is dry. Impregnating the timber when green, and operating on large balks, would perhaps be more economical than upon smaller pieces when cut up. Moreover, the coarse-grained, quickly-grown timber required in this case is most suitable and cheapest; but then salts are said to make wood soft, and cut across the grain, so that it might be difficult with the ordinary hand-saw to cut out the more delicate work which is so largely used in Japanese houses.

Lastly, if the wood is impregnated while green, the non-inflammable solution acts chemically on the sap and destroys the germs of rot; for although most of the sap is driven out and replaced by the solution, still a little remains in the moist wood, and this would tend to dilute the injected solution, and also cause subsequent decay. Of course the "shortness" of the wood caused by salts applies to balks, whether prepared when green or well seasoned. These remarks are by way of preface. The following has reference principally to the preservation of telegraph-poles from decay, but is equally applicable to our subject.

Gavey and Douglas say: "The physical formation of a tree is made up principally of cellular tissue, woody fibre and vascular tissue. Cellular tissue consists of little colorless bladders or vesicles of various figures adhering together in masses and filled with liquids. Woody fibre is an elongated form of cellular tissue, incrusted and hardened by various substances, which give the distinguishing characteristics to different classes of timber. Vascular tissue consists of small membranous spiral tubes or vessels, which aerate and transmit some of the fluids in the plants. If a transverse section of a piece of exogenous timber be examined, it will be found to consist (1) of a small portion of central pith; (2) the woody portion, divided into the heartwood and sapwood; (3) the bark, which latter is divided into the true bark and epidermis; and, lastly, the medullary rays, which are thin vertical plates connecting the bark and the pith, and radiating from the centre to the circumference. In a young shoot, the pith, which consists wholly of cellular tissue, appears to serve as a vehicle

[2] A paper read before the Civil and Mechanical Engineers' Society on Wednesday, April 22. By Thomas Manson Rymer-Jones, M. Inst., C. E., F. R. G. S., and John Rymer-Jones, Memb. Inst. Tel., Eng. Reprinted from the *Building News*.

for the ascending sap, which, rising from the roots to the leaves, there comes in contact with the air, where it combines with the elements necessary for the formation of the tree. Woody or ligneous fibre and vascular tissue extend vertically downwards, and at the same time cellular tissue is formed horizontally. The ligneous fibres are attached to each other, as it were, in bundles, by their respective coats, whilst the cellular tissue is forced into the thin vertical plates, termed the medullary rays, which connect the pith with the bark (known as silver grain). The residue of the sap descends through the inner bark to the roots. Thus a layer of wood is gradually formed between the medullary sheath and the bark, and this continues until the approach of winter and the fall of the leaf stop the operation. On the following spring the sap again ascends, and during the year a second layer of wood is deposited; and as each season advances towards winter the deposit takes place more and more slowly, so that well-defined rings distinguish each year's growth; the number of the rings indicating the age of the tree in years, and the thickness of each ring the rate of its growth. Sometimes in hot climates there is so little difference in activity at various seasons that the rings cannot be accurately defined. In temperate seasons the sap rises during the spring, and leaves are developed. In summer the sap almost ceases to flow and vegetation remains stationary. In autumn the sap descends, and the leaves fall off. In winter the tree becomes again inactive. In tropical climates the dry season is the period of inactivity.

"When wood is going to be seasoned in the ordinary way, the best season for felling trees is when the circulation is least active; viz., the middle of the summer or winter periods of quiescence, and during the dry season in tropical climates. After a few years the ligneous fibres deposited nearest the centre become darkened, hardened, more dense, and apparently impervious to the sap, which latter circulates upwards through the layers of woody matter last deposited; hence the distinction between the heartwood and the sapwood."

Sabine and Douglas say: "Dr. Boucherie has discovered that no connection exists laterally between the tubes of a tree, and that by applying, under a moderate pressure, a colored solution to certain tubes at one end of a tree, the same tubes at the other end of the tree, and only those, are colored. In this way, at one end of a felled tree he applied a colored solution to certain tubes, forming the name 'Faraday'; the name was transmitted to the other end and was perfect at every intermediate section, showing that there was no lateral diffusion."

On the other hand, Langdon says: "That there is a lateral connection between the fibres may be proved by reference to a creosoted pole, where, under pressure, the creosote penetrates between one and two inches." It is generally understood that there is some, but very little lateral connection, so that in order to do it thoroughly the injection should take place from the ends. Inasmuch as the sap in timber contains the elements of decay, in the higher class of construction it is necessary to use wood most free from sap, or to a use of special means to eliminate it by the internal application of preservative solutions, which either expel or neutralize the fermentative portion of the sap. Although the solutions used generally for the preservation of timber from rot need not be the ones best suited for rendering the same fireproof, yet the method of application is similar. We will therefore describe the system most commonly used.

It is better and generally cheaper to select soft woods, such as Scotch pine, which is admirably adapted for injecting processes. It is of very coarse grain, its annular rings are wide apart, tissue soft, and capable of great absorption. The idea in the ordinary methods adopted for preserving timber from rot is to introduce into the pores of the wood some salt, which, uniting chemically with the albumen of the sap, is stated to convert it into an insoluble compound. The best known of these processes are Burnettizing, Kyanizing, and Boucherizing (creosote is, of course, out of the question). Burnettizing consists in impregnating the timber with a solution of chloride of zinc, and Kyanizing with corrosive sublimate (chloride of mercury).

Langdon says: "In both processes open tanks are filled with the solution with which the timber is required to be charged; the timber is then submerged, well fixed, and allowed to remain soaking until it has absorbed the proper quantity of the solution."

Culley says: "Kyanizing, or steeping the timber in a solution of bichloride of mercury or corrosive sublimate, has not been extensively tried for poles, because of the expense, and because it does not succeed unless the timber is dry. The poisonous nature of the salt is a very serious objection."

Spagnoletti says, with regard to the chloride of mercury process: "Two pounds of corrosive sublimate, at 3*s.* per pound, will be sufficient for fifty cube feet of timber. The time for preparing should be one day per inch in thickness, and one day over. Thus, two days for one inch, three days for two inches, and so on; one advantage of this preservative is that the timber may be cut down and cast into the tank at once, the sooner the better, and no preparation or seasoning is necessary." He thinks it an excellent preservative of wood.

The superficial coating obtained by mere soaking is perhaps good enough for telegraph-poles, when the latter are thoroughly dry to begin with, and the heartwood hard; but to make wood fire-proof it would be necessary to thoroughly saturate the wood with the solution, and the following mode of injecting telegraph-poles is much better. The operation generally takes place in strong cylindrical tanks, in which are fitted hemispherical ends, removable at will; to save labor they are usually provided with a line of rails, which communicates with tramways running through the preserving-yard. The poles, being stacked on light trucks or trollies, are thrust into the the tanks, the ends of which being then closed, the interior is exhausted with powerful air-pumps driven by steam. The object of this is to draw out any moisture that may remain in the wood (the timber must be thoroughly dry before it undergoes the operation), and also to create vacuums in the pores, which may be filled by liquid. The liquid is then allowed to flow into the tank, and exposed to pressure varying from one hundred to one hundred and fifty pounds per square inch. The contents of the tanks and the quantity of timber in them being known, the exact quantity of salt injected into the wood per cubic foot can easily be calculated. The salts evidently combine with the elements in the sap which tend most readily to ferment, and, by precipitating them and forming new and insoluble compounds, check this tendency and lengthen the life of the timber. If a transverse section of a pole thus treated be examined, it will be found that the sapwood alone is permeated by the salt, the heartwood remaining untouched. The elements of decay, however, are far more fully developed in the sappy portion of the timber than in the heartwood, and the latter is rarely attacked (speaking of rot, of course, not of fire) until the former is rotten.

Sabine says: "The posts are put into wrought-iron cylinders, four and one-half feet to six feet diameter, and thirty-four feet to sixty feet long, closed at one end, and covered at the other with tightly-fitting tops. The cylinders are provided with manometers, safety-valves, etc., and connected with air and pressure pumps and a reservoir of the preservative solution. The wood is preserved by being subjected to a great pressure of steam, which, penetrating into the interior, not only tends to displace the sap from the pores and prepare them for the preservative solution, but also to coagulate the albumen in the sap, and in this way retard the subsequent rolling. After this the cylinders are exhausted and immediately filled with a solution of one part chloride of zinc and thirty parts of water (for Burnettizing) which is kept under a pressure of eight to ten atmosphere, equals one hundred and twenty to one hundred and fifty pounds for three hours; but it is questionable if this method is so good as that of Dr. Boucherie (Boucherizing), as it is necessary to force the solution into the wood at right-angles to the tubes, thereby injuring its strength and letting the sap, which is the immediate cause of decay, remain; the coagulation of the albumen in the sap to any material depth below the surface being a matter of doubt."

From this it would appear that the timber need not necessarily be dried prior to the operation, as other men state, and in coarse-grained woods, where the injection is complete throughout the whole bulk. This, then, is the degree of saturation when ordinary strong timber, consisting partly of sapwood and partly of heartwood, even when expensive cylinders with powerful air-pumps, etc., are used, so that the following method of injection, which is employed for Boucherizing, would (should no after considerations prevent it) be the most suitable for the purpose, should it be wished to completely saturate the woods throughout, since the apparatus is comparatively cheap and portable, the timber best suited being coarse-grained, quickly-growing, and consequently less costly, and, in fact, of the kind mostly used for house purposes, the operation performed in the forest where the timber is cut down, and whilst it is yet green and full of sap.

The method follows: Newly-cut green timber (coarse-grained is most suitable), before its bark is removed, is exposed at the butt ends to a slight pressure of a liquid column of sulphate of copper; the liquid is usually arranged in tanks at a height of some fifty feet above the level at which the tree is placed. The pressure forces the liquid through the longitudinal pores of the timber, till it drops out at the other extremity, both driving the sap before it and forming the chemical combinations which effect the preservation of the wood from decay. Poles should be exposed to the operation without the slightest delay after they are felled, or the process will probably fail, as the resinous substances readily harden and prevent the movement of the liquid salt through the pores. The plant needed is inconsiderable, and can be set up in any locality, the only requirement being a clear space of open ground; this gives this system an advantage over others which demand expensive and powerful machinery. The arrangements in a Boucherizing yard may be thus described: Any open tank of any convenient capacity is erected on poles, at a height varying from thirty feet to fifty feet; some prefer twenty-three feet to twenty-six feet from the ground. Culley says: "twenty-four feet, since, if it is too high, the liquid flows too rapidly through the timber to produce the best effect." From this tank descend two leaden pipes, about one and one-half inches in diameter, one of which is connected with the force-pump designed to fill the tank with liquid, the other serving to convey the liquid to the poles; the latter are laid side by side on racks placed horizontally, and are arranged at right-angles to a passage running the whole length of the yard. Down this passage is carried the leaden pipe from the tank, and at regular intervals of eighteen inches along this pipe small branch pipes with stop-cocks are fitted. As each pole is felled and hauled into the Boucherizing space, a section is cut off the butt end, to expose a fresh, uncoagulated surface of wood. Near the circumference of this newly-cut surface a strip or ring of India-rubber is nailed; then a flat board, somewhat larger than the base of the pole, is screwed against it by means of iron dogs (tenon bolts).

A hole in the centre of the board admits the insertion of a hollow

boxwood plug, which is connected with one of the small branch pipes previously alluded to, by means of a short length of flexible India-rubber tubing. This plate or disc, together with the India-rubber ring just mentioned, forms a water-tight chamber for the reception of the solution of sulphate of copper, communicating with the vertical pressure pipe. The air must be carefully expelled from the chamber formed at the butt end of the pole. This is best done by inserting a wire between the pole and the packing which forms the side of the chamber. After the tap has been turned to admit the solution, the wire is withdrawn, leaving a small hole, and when the liquid spurts out freely, showing that the air has escaped, this hole can be closed by a blow from a hammer. Neglect of this precaution has frequently prevented the injection of the upper side of the entire pole. The tap being turned, the liquid solution is driven into the pole with a pressure dependent on the height of the tank above the racks.

The proportions of the solution are one pound of sulphate of copper to five gallons of water (Douglas says one part by weight of the salt to one hundred parts of water). It is usual to inject 0.35 pound of the sulphate into every cubic foot of timber. This gives a weight of one and one-half to two pounds of sulphate for the smallest pole (about twenty-five feet long). After the lapse of a period varying from two to twenty-four hours, the liquid makes its appearance at the top of the pole and drops into gutters placed conveniently to catch it. Douglas says "three days is the average time required to inject a twenty-five foot pole." The process is complete when every portion of the top of the pole is found to be saturated with sulphate of copper. This is known to be the case when a brown stain is left on the timber by the application of a piece of potassium ferrocyanide.

Another authority says: "Scotch fir having a very open grain is the best suited for preservation by the injecting process. To Boucherize successfully, the worst timber (that is, as regards its chance of lasting unprepared) is wanted. In some cases, where the poles were too old, a month elapsed before the copper liquid applied to the butt appeared at the top of the poles."

Another authority of large experience says: "Scotch fir, grown on a peaty soil, coarse grain and open: The average time taken to successfully Boucherize three twenty-eight-foot poles, during the months of April, May, June, July, August and September was from five to seven days. In October, November and December, January, February and March, about ten days. In June, the quantity of liquid that percolated through three twenty-eight-foot poles was sixty-eight gallons, and soft larch took a few days longer than the Scotch, but answered very well. Some few red or hard larch were successfully done, but in others the solution only penetrated a very short way from the end. Spruce and silver pine answer well, but take much longer than do either larch or Scotch."

Cully says: "It is quite possible to inject trees that have been cut down two or three weeks; but the labor will be much more costly than when injected in the forest on the day they are felled, because the pores contract in drying. It is extremely difficult to inject larch unless it is of very open grain and very free from resin. The liquids cannot penetrate the hard wood, and it has sometimes happened in Boucherized poles that the heartwood, which is more durable than the sapwood under ordinary circumstances, has rotted, leaving the sapwood sound. Spruce and Scotch fir are very suitable, and these cheaper descriptions of fir are rendered more durable than the more expensive sorts when unprepared. The cost of the sulphate process calculated on five thousand two hundred and eighty-seven Scotch fir-poles injected in the forest, and averaging twenty-five feet in length, is about 2*d.*, equal to four cents per lineal foot of timber."

Another authority says: "The process is most successful during the spring and summer months (Culley says the autumn), when the sap is in the wood. Cold hinders, and frost stops it." Timber, when chosen for strength and seasoned in the ordinary way, is of course felled in the winter months, when the sap has retreated from the wood. It is possible to treat the wood, with equal success, from the top or small end as from the butt end. The application of the sulphate of copper to the small end instantly starts the sap, which pours out from the large end. The Boucherizing of the pole was completed, in a particular experiment, in the usual time. In the construction of a house it would be necessary, in the case of the upright timbers which stand in the moist ground, to provide for the escape of the fire-proof salt, by paving the lower end with a coating of some insoluble or water-proof paint, which should also be fire-proof. Such a paint we shall give farther on. Without this precaution much of the salt is lost in the ground, and the surrounding ground in which the Boucherized pole stands will be found tainted for some twelve inches or more with sulphate of copper."

Dr. Boucherie says, however: "It is an error to suppose that the sulphate of copper is very soluble, or that when it is exposed to the rain its preservative power disappears after a certain time. The sulphate of copper fixes itself into the elements of the wood, and could not be dissolved by washing. Cases of failure are to be attributed to a disease in the wood, the diseased tissues seeming to resist the sulphate."

Professor Abel also objects to the theory of the salt being washed out when a telegraph-pole is standing in moist ground. He says: "I believe a small quantity of the copper salt is converted into insoluble compounds. The action of the metallic compounds is to combine with certain albuminous substances in the wood, by which they are converted into insoluble substances, and it is by the chemical alterations which these undergo that the preservative effect is produced." It is generally allowed, however, that the preservative effect of sulphate of copper is very variable.

Professor Abel, judging from experiments on Boucherizing and Kyanizing for the preservation of wood from decay, says: "Generally the results were favorable to Boucherizing." He believes "opinions are fairly divided between them — that is, the copper salts and mercury salts, which are undoubtedly both good preservative processes."

Dr. Boucherie says: "Sulphate of copper combines so well with the celluline that washing with pure water will never expel it."

Culley says: "The sulphate of copper must be free from iron, as it is inert and possibly hurtful; besides this, the iron becomes oxidized by exposure to the air and forms a muddy deposit, which chokes the fine filter formed by the pores at the end of the pole, and thus stops the process, as the sulphate always contains *some* iron (Japanese sulphate of copper obtained from the Mint contains a large quantity but varies much in this respect). It is well to make a saturated solution and allow it to remain exposed to the air as long as possible, so that the iron may deposit at the bottom of the vessel, after which it may be diluted for use. If the solution is too strong, it appears to contract the sap vessels and to crystallize at their ends. The water must be free from lime and perfectly clear. If it contains lime it is as well to add a little sulphuric acid to precipitate it, and either allow it to settle, or filter the water through sand, for even the slightest cloudiness interferes with the injection."

THE ILLUSTRATIONS.

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

THE WEST FRONT OF THE CATHEDRAL OF NOTRE DAME, ROUEN, FRANCE.[1]

JOHN SELL COTMAN, "the second painter of the Norfolk School," was born at Norwich in 1782. He was mainly self-taught as an artist. In 1800 he went to London and resided there for some years, exhibiting at the Royal Academy till 1806. He then returned to Norwich, and was made a member and secretary of the Norwich Society of Artists, afterwards becoming vice-president, the president being John ("old") Crome. In 1834, through the influence of Turner, he was appointed Professor of Drawing in King's College School, London, which position he held until his death, in 1842.

Cotman was a landscape and marine painter of great power. He used both oil and water-color, although perhaps best known by his etchings of architectural subjects: referring to the latter, he said, "I decidedly follow Piranesi." His principal works in this direction were "*Architectural Etchings of Old English Buildings*," 2 vols., folio, 240 plates; "*Sepulchral Brasses of Norfolk and Suffolk*," 2 vols., 170 plates; "*Liber Studiorum*," 48 plates. After several journeys to France, he issued his most famous work, "*Architectural Antiquities of Normandy*," in two folio volumes, comprising one hundred plates. This was published in 1822, with descriptive letter-press by his friend Dawson Turner, the architect and antiquary, who had accompanied him on his journey to Normandy in search of material for the book. Our plate, with others of a similar nature which we have reproduced, is taken from this work, in which he preserved many neglected and decaying monuments of the past.

Cotman's plates are rich in accurate detail, but wanting in qualities of light and shade. He must not, however, be judged as an artist by his somewhat dry and antiquarian etchings alone. He had a thorough knowledge of the varying faces of Nature, and was not deficient in imaginative power. We owe him thanks for faithfully and lovingly transcribing for us the relics of ancient Normandy, leaving to Turner (who followed in his footsteps some years later with "*The Rivers of France*") the clothing of castle and spire, with a veil of glorious though fading splendor — false but beautiful. The more honor to Cotman, as he had the true artist's nature, too, and had woven magic webs of shifting color with his own brush. Wedmore, in his "*Studies of English Art*," says that he might almost be called the precursor of Turner, in experimenting with effects of color and light.

"THE western front of the cathedral offers a *tout ensemble* of the most imposing character. The very discrepancy in the different parts, by increasing the variety, adds to the effect of the whole. All, with the exception of the northern tower, is rich even to exuberance; and the simplicity of this, at the same time that it appears to lay claim to a certain dignity for itself, places in a stronger light the gorgeous splendor of the rest. The opposite tower, the work of the celebrated Cardinal Georges d'Amboise, and formerly the receptacle of the great bell that bore his name, commonly passes by the appellation of the *Tour de Beurre*. Tradition tells, or, to use the words of Don Pommeraye, 'everybody knows' that it obtained this name from its being built with the money raised from the indulgences granted by the Cardinal, William d' Estouteville, to the pious Catholics throughout the dioceses of Rouen and Evreux, allowing

[1] From Cotman's "*Antiquities of Normandy*."

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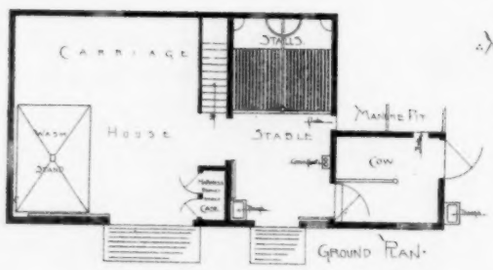
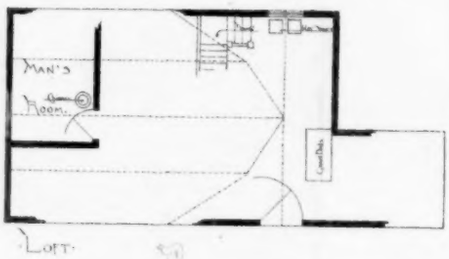
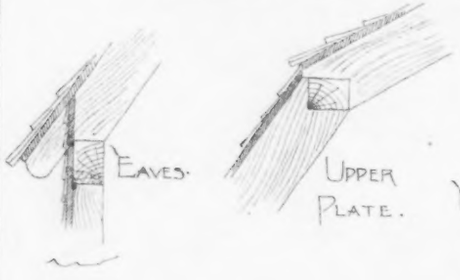
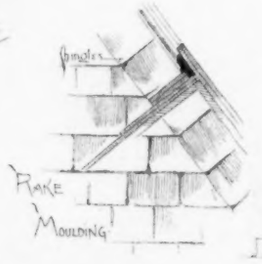
PERSPECTIVE SKETCH OF BARN

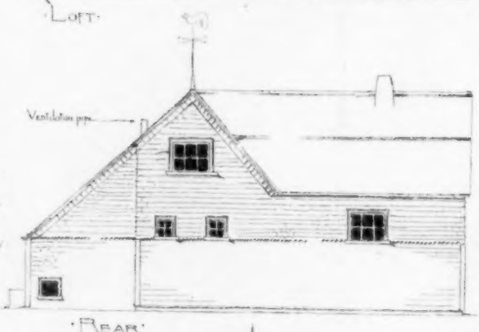


Notes.- Chimney to be of sheet iron and to start on second floor. Cow stable one foot lower than stable. Small doors to Manure Pit to slide up. Covers (hoods) to go from barn to shed in stable.









AMERICAN ARCHITECT COMPETITION.

A BARN,

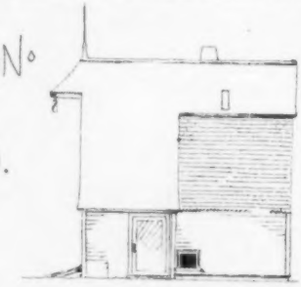
TO COST ABOUT $1200.

DESIGN SUBMITTED BY,

"RYE"

Scale of plans and elevations.

Scale of Details.



HELIOTYPE PRINTING CO. BOSTON.

THE PLIMPTON PRESS, NORWOOD, MASS., U.S.A.

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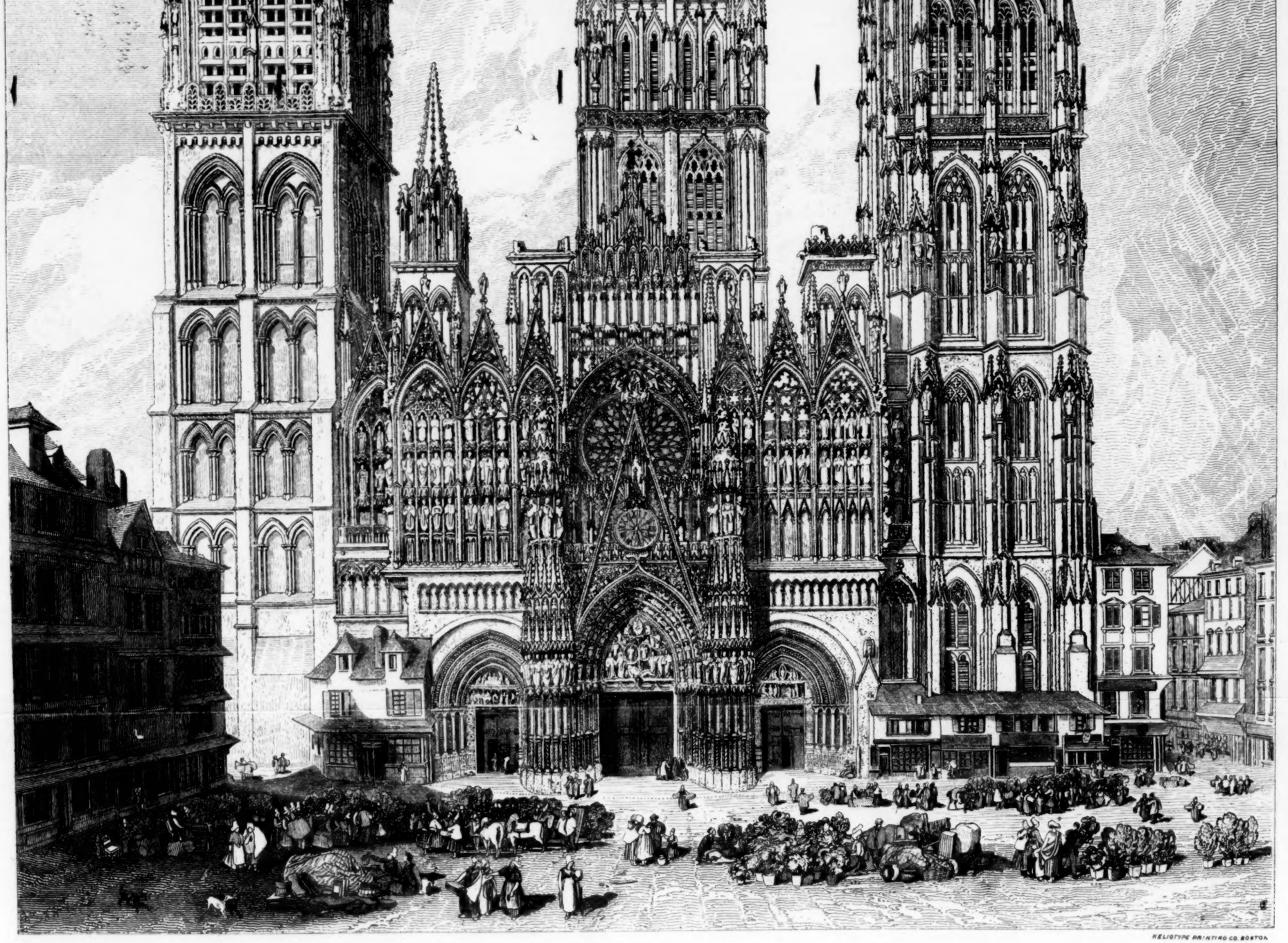

HELIOTYPE PRINTING CO. BOSTON

CATHEDRAL CHURCH OF NOTRE DAME, AT ROUEN,

IN THE YEAR 1821.

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Perspective View of House.

R. Cutler, Architect, Springfield, Mass.

HELIOTYPE PRINTING CO BOSTON

them to make use of milk and butter during Lent, when oil only could otherwise have been employed by way of sauce to vegetables and fish. The bull issued upon the occasion by Pope Innocent VIII is stated to be still in existence.[1] The architecture of this tower may almost be regarded as the perfection of what has been called the Decorated English style. It is copiously enriched with pinnacles and statues, and terminates in a beautiful octagonal crown of open stone-work. Its height is two hundred and thirty French feet.[2] The central portal, for the erection of which the cathedral is likewise indebted to its great benefactor, Georges d'Amboise, projects beautifully and boldly, like a porch, before the rest. Every side of it is filled with niches, tier over tier, all crowded with endless figures of saints and martyrs. In the middle of it rises a pyramidal canopy of open stone-work, and upon the wide transom stone over the door is sculptured the genealogical tree of Christ, arising from the root of Jesse. The carving over the north entrance is yet more peculiar, and evidently far older. It represents the decapitation of the Baptist, with 'Salome dancing in an attitude, which perchance was often assumed by the *tombesteres* of the elder day; affording by her position a graphical comment upon the Anglo-Saxon version of the text, in which it is said, she *tumbled* before King Herod.' Four turrets flank the central portal; one of them only is now capped by a spire; the pinnacles of the remaining three were swept away by a storm which traversed Normandy for a considerable extent, on the 25th of June, 1683, marking its progress with a devastation that is scarcely to be conceived. The spire of the central tower, however vaunted and admired by the French themselves, looks to an unprejudiced eye mean and shabby, and principally from its being made of wood, which ill accords with the apparent solidity of the rest of the building."

COMPETITIVE DESIGN FOR STABLE, SUBMITTED BY "*Rye*."

THERE will be no cellar. The building will be set on a trench-wall. The frame will be of spruce, and will be covered with hemlock boards. First floor of two-inch plank; second floor of matched spruce boards. Stable, carriage-room and man's room to be sheathed on walls and ceilings. Stall-gutters, feed-boxes and hay-racks of cast-iron. The cow-stable is entirely distinct from the horse-stable, with door between. Water-pipe to connect with troughs and wash-stand, and to be carried from wash-stand and gutters in stable to a cesspool. Roof and upper part of walls shingled and lower part of walls clap-boarded, as shown on elevations. There will be a ventilation-pipe over each stall which will unite into one pipe and pass through the roof.

State Street, CAMBRIDGEPORT, MASS.

We will build stable according to design by "*Rye*" for $1,200.

JOHN L. MAYERS & CO.,
Carpenters and Builders

THE DINING-HALL IN THE MEMORIAL HALL OF HARVARD COLLEGE, CAMBRIDGE, MASS. MESSRS. WARE & VAN BRUNT, ARCHITECTS, BOSTON, MASS.

[Gelatine Print, issued only with the Gelatine Edition.]

THIS building, plans, elevation and certain details of which have appeared in former numbers of this journal, was completed in 1878. The central part of the building is the monumental vestibule to Sanders Theatre on the one hand and to the Dining-Hall on the other; in this vestibule are contained the memorials of the students and graduates of the University who died in the service of their country in the war for the Union. The Dining-Hall, shown in the gelatine plate, is 58 feet 6 inches wide by 149 feet long; it contains ten bays, with open-timbered hammer-beam roof; has galleries at either end; shows brick construction on the interior walls; and, against the wainscot, are set the busts and portraits belonging to the University. The Hall is used for the great annual festivals; and daily during term times it serves as commons hall for about 600 students, who take their meals here under the auspices of an association managed by the students themselves. The windows are to be filled with memorial glass of the first grade; of these eight are already occupied and several more are immediately contemplated or are in process of construction. Most of them are erected by classes in memory of classmates who fell in the war for the Union.

DESIGN FOR A HOUSE. MR. ROBERT OYLER, SPRINGFIELD, MASS.

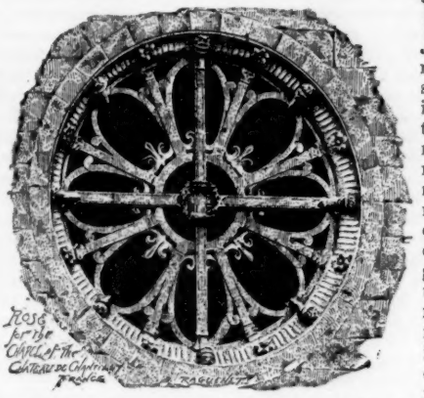
[1] *Pommeraye, "Histoire de l'Eglise Cathédral de Rouen,"* p. 36.

[2] The following are the dimensions of the principal parts of the cathedral, in French measure, copied from Mr. Turner's *Tour in Normandy*, I, p. 147:—

	French feet.		French feet.
Length of Interior,	408	Length of Transept,	164
Width "	83	" Lady Chapel,	88
Length of Nave,	210	Height of Spire,	380
Width "	27	" Towers at west end,	230
" Aisles,	15	" Nave,	84
Length of Choir,	110	" Aisles and Chapels,	42
Width "	35½	" Interior of Cent'l Tower,	152
" Transept,	25½	Depth of Chapels,	10

[A French foot contains 13½ English inches.]

SOME CELEBRATED TIMBER ROOFS.[3]—I.



MY subject to-night is celebrated timber roofs, and perhaps some one may be inclined to ask at the outset, Why not rather iron roofs, since the most conspicuous roofs of the present day — such, for example, as our great railway-station sheds — are now carried by iron framing? Possibly it would be a sufficient answer to reply that this is Carpenter's Hall, and that I desired to select a topic which has to do with carpentry.

A good roof displays the skill of the carpenter better than any other piece of work, so that we should study the best things of the sort that have been done, even if only out of interest in carpentry. Another and a better reason is that, though the iron-master is constructing our largest roofs now, he is not able to compete with the carpenter when it comes to roofs of moderate size, and as those of us here who are carpenters and builders, or who have to design buildings, will be sure to have to do with timber roofs for all ordinary work, it will be a help to know something about the best specimens that exist. A man never does full justice to himself unless he knows and can understand something a little beyond what he actually has in hand. So a single famous roof, thoroughly mastered, will be instructive even to those who have only very modest ones to frame.

Moreover, though iron-work has been found to have advantages which carpentry does not possess when the new requirements of trade and travelling have to be met, it must not be forgotten that in those numerous instances where the roof forms part of the architectural treatment of a fine interior, such as a church or public hall, timber from the very nature of things holds its own, and must do so. No ingenuity could fit buildings such as the Guildhall or Westminster Hall with iron roofs that would be consistent and beautiful, and where a roof is to be a work of art as well as of skill, the carpenter must frame it.

Last, and by no means least, manufactured iron is not to be had everywhere. In the colonies, and in many foreign countries, if a large roof is wanted there is nothing but timber to make it of; and as, happily, England and her colonies are growing closer together as time goes on, we must be ready, any of us, in case we are wanted, to build or design in a manner suited to the circumstances of countries far removed from our own. I trust, therefore, that, for all these practical reasons, and not simply as an antiquarian or scientific study, we shall find it profitable to give attention to a few of the best known examples of timber roofs, ancient and modern.

[The lecturer here discussed and explained some of the elementary principles upon which carpenters base their practice in the matter of roof construction.]

Very large timber roofs on the queen-post principle have been framed. The limit to the span which may be usefully covered is the length of timber obtainable; for though the tie-beams, which are only under tension, may be joined, the rafters must each be in one piece. A great difficulty arises, however, in practice, especially in the case of roofs of fir-timber, which, though light, strong and elastic, is apt to lose its elasticity in time, and take a permanent set. Fir-timber, unfortunately, is also comparatively soft, so that the very great weight of the roof and its covering, with the addition of wind-pressure and snow, etc., is apt to squeeze the timbers together at the joints, and to cause a slight giving way, which throws the framing more or less out of shape, and destroys its efficiency.

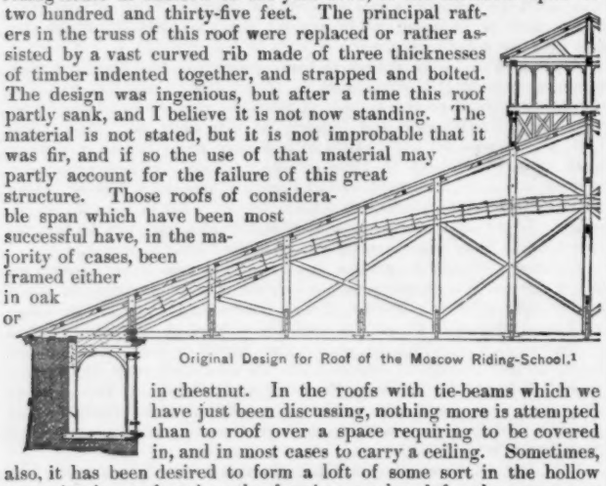
Examples of roofs with tie-beams, and either king-posts or queen-posts, abound. Few of them can, however, be fairly called famous; partly, no doubt, because they mostly carry ceilings, and so their construction is seldom open to inspection.

I will, however, refer to one very bold timber queen-post roof, with a tie-beam and collar-beam, which is instructive because it has partly failed, and which can be seen without difficulty. I refer to the roof over part of the Southeastern Railway's London-Bridge Terminus, This roof was put up about the year 1850, and every principal is now supported by a prop. The span is ninety-two feet. The trusses are twenty-one feet apart from centre to centre. The principal rafter is twelve inches by nine inches, and the tie-beam fifteen inches by nine inches. In each truss there are five iron rods doing duty as queen-rods and intermediate rods, and the heads of the principal rafters and straining-piece are received into a cast-iron queen-head. The pitch, *i. e.*, the slope or angle with the horizon, is 21° only.

[3] A lecture by Professor T. Roger Smith, delivered at Carpenter's Hall on Wednesday evening, April 1st, being the last of the present series of "Free Lectures to Artisans on Matters connected with Building," given under the auspices of the Carpenter's Company, and published in the *Builder*, the illustrations being added by the *American Architect*.

The failure of this roof may probably be traced to a series of causes rather than to any one prominent defect. The deficiencies of fir-timber have been already pointed out, and here as elsewhere a close examination would no doubt show that the joints have compressed slightly, and that the timbers have bent. The distance apart of the principals is rather great, which throws a greater load on each truss than it ought to have. The pitch is too flat, which greatly increases the strain upon every part of the structure. The braces under the principal rafter are too few, and both the principal rafter and the collar-beam are loaded not at the strong points, those, namely, stiffened by the braces, but at points away from them, so as to be subjected to some cross strain. The scantlings are light, considering the work the timbers have to perform; and the large amount of flat space in the middle, and the small angle of the slope at the sides, would favor the lodgement of snow, so that a heavy fall of snow would throw a tremendous burden on to the framework of this roof in addition to what it has ordinarily to carry. Putting all these causes together, there is no reason to be surprised at the failure of this roof; and yet its appearance is striking, and gives the idea of its being both elegantly, skilfully and boldly designed. Boldness has, however, been pushed too far.

It is believed that the widest timber roof in one span, with or without a tie-beam, ever executed is one that was erected over a riding-house at Moscow in the year 1790, of the enormous span of two hundred and thirty-five feet. The principal rafters in the truss of this roof were replaced or rather assisted by a vast curved rib made of three thicknesses of timber indented together, and strapped and bolted. The design was ingenious, but after a time this roof partly sank, and I believe it is not now standing. The material is not stated, but it is not improbable that it was fir, and if so the use of that material may partly account for the failure of this great structure. Those roofs of considerable span which have been most successful have, in the majority of cases, been framed either in oak or



Original Design for Roof of the Moscow Riding-School.[1]

in chestnut. In the roofs with tie-beams which we have just been discussing, nothing more is attempted than to roof over a space requiring to be covered in, and in most cases to carry a ceiling. Sometimes, also, it has been desired to form a loft of some sort in the hollow space in the roof, and as the framing employed for these purposes has been designed to secure only those ends, it has been possible to use all the timbers in the situations where the very most could be made of them.

In making a roof, however, we enclose and cover in a large space above the tops of our walls, and in many cases it is desirable to use this space, not by constructing a loft in it, but by adding it on to the space below. This is simply enough done by putting such a roof as we have described on side walls, and leaving out the ceiling; but the tie-beams and framing very often have an appearance not in accordance with the architectural design of the building, and in many cases, as, for example, in the nave of a church, where the gable is occupied by a large window, the line of them will cut across and destroy the effect of an architectural feature. Accordingly roofs without tie-beams have been found requisite, and these form by far the most important and most interesting part of our subject. Roofs of this class were largely employed throughout the period which saw the rise and progress of Gothic architecture, as well as in modern times.

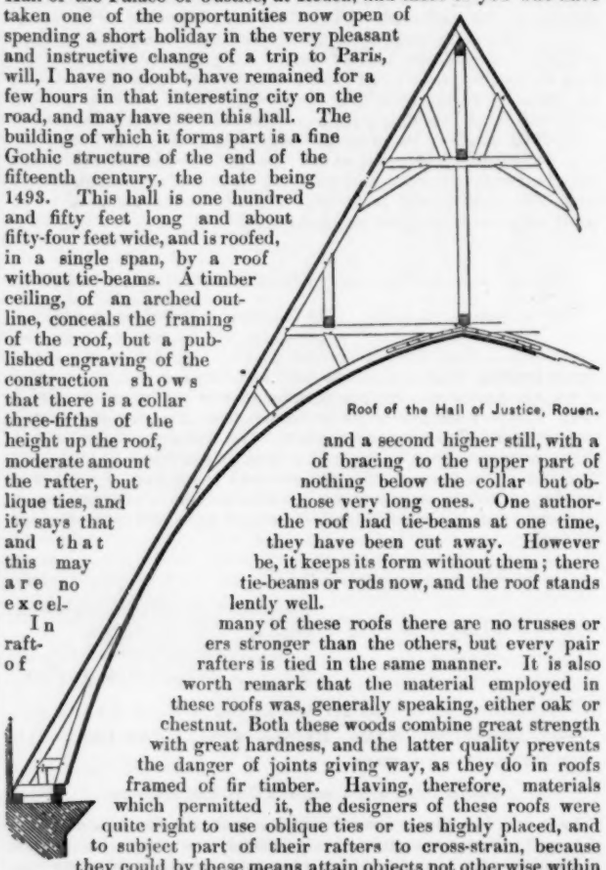
My friend Professor Kerr, in his opening lecture,[2] was necessarily restricted by his subject to tie-beam roofs, so that this class of structures was not touched upon by him; but I regret that when alluding to an unscientific form of roof occasionally to be met with in churches of small span, he did not do our forefathers the justice to add that innumerable specimens of their skill as roof-carpenters, accompanied by the greatest taste, have come down to us from the past. He may (unintentionally, I am sure) have left on the minds of some here the impression that the Gothic idea of a roof was only to throw a beam from wall to wall, to stand a post on the middle of it, and then to carry rafters from the top of the post to the wall. I am quite aware that this sort of roof is to be met with, yet I hope to succeed in showing you that in the centuries we call the Middle Ages carpentry was carried to great perfection, and I am the more anxious to do this because there is no country in Europe where carpenters were more skilful than in England, and because the acknowledged masterpiece of ancient carpentry is to be found in this metropolis, the work of English hands and the contrivance of English designers.

[1] We give an illustration of the truss to which the lecturer refers, although he has fallen into the common error of believing that the roof of the Moscow Riding-School was executed according to this, the design of a German carpenter, prepared about 1790. The building, by the way, which the roof was intended to cover, measured about 72m x 585m in the clear. The roof, as actually constructed, was designed on an entirely different principle, by M. de Betancourt, and was built about 1818, after very exhaustive tests of trial trusses, in the short space of five months.

[2] See *Builder*, p. 264, *ante*.

We have seen that where a timber is short it may be able to sustain a considerable amount of cross-strain, such as would break it were it long, and the earliest attempts at throwing the roof more into the body of the building than is possible with a tie-beam were made by putting the tie part of the way up the rafters, so that there was a short piece of rafter between it and the wall exposed to a strain which is partly transverse. A second step was taken when, in order to get rid of the straight line of the tie, two oblique timbers, each starting from the foot of one rafter and getting hold of the other some way up, were employed. Sometimes these two methods were combined, as in the timber roof over the vaulting of Westminster Abbey. In this manner, but with all kinds of variations, sundry very picturesque church roofs have been framed. Some of them carry polygonal ceilings, others show their timbers; but in either case the eye is carried upwards, and the space in the roof is virtually added to the building.

One remarkable example of this kind of roof is to be seen at the Hall of the Palace of Justice, at Rouen, and those of you who have taken one of the opportunities now open of spending a short holiday in the very pleasant and instructive change of a trip to Paris, will, I have no doubt, have remained for a few hours in that interesting city on the road, and may have seen this hall. The building of which it forms part is a fine Gothic structure of the end of the fifteenth century, the date being 1493. This hall is one hundred and fifty feet long and about fifty-four feet wide, and is roofed, in a single span, by a roof without tie-beams. A timber ceiling, of an arched outline, conceals the framing of the roof, but a published engraving of the construction shows that there is a collar three-fifths of the height up the roof, and a second higher still, with a moderate amount of bracing to the upper part of the rafter, but nothing below the collar but oblique ties, and those very long ones. One authority says that the roof had tie-beams at one time, and that they have been cut away. However this may be, it keeps its form without them; there are no excellent tie-beams or rods now, and the roof stands well.



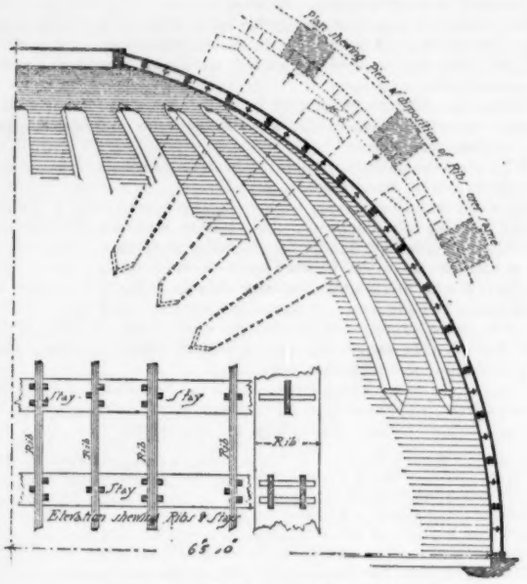
Roof of the Hall of Justice, Rouen.

In many of these roofs there are no trusses or rafters stronger than the others, but every pair of rafters is tied in the same manner. It is also worth remark that the material employed in these roofs was, generally speaking, either oak or chestnut. Both these woods combine great strength with great hardness, and the latter quality prevents the danger of joints giving way, as they do in roofs framed of fir timber. Having, therefore, materials which permitted it, the designers of these roofs were quite right to use oblique ties or ties highly placed, and to subject part of their rafters to cross-strain, because they could by these means attain objects not otherwise within reach, and could do so without sacrificing the stability of their structures.

A distinct class of roofs of large span, framed without tie-beams, next claims notice. I refer to *roofs with ribs*. Many of these are mostly of later date and wider span than the greater part of those already considered. The truss of Westminster Hall, it is true, displays, as we shall find, a large rib used for the structural purpose of steadying and stiffening the whole combination, and for the architectural purpose of adding to the framework a powerfully-marked line of an arched form; but such rib is only an auxiliary, as, for example, in the Moscow Riding-School already mentioned. In some other examples a rib more or less similar to this forms the chief feature of the roof. The oldest specimens of the class, where the rib does the main part of the work known to me, are two Italian examples, of which Professor Lewis has kindly sent particulars. A great hall at Vicenza, known as the Basilica, built in 1314, though since modernized, no less than seventy feet wide, is covered with a curved roof in the form of a pointed arch, in a single span from wall to wall, curved outside as well as in, and so resembling very much the hull of a ship turned upside down. The supports of this roof consist of ribs of timber about twelve inches by twelve inches. Each rib is tied by two iron tie-rods, the first about one-third of the height up from the springing; the second about two-thirds up. A still larger hall of about the same date exists at Padua. It is two hundred and sixty-one feet long by about eighty-five feet wide, and has a similar roof, of which the ribs are about thirteen inches by thirteen inches, and about six feet apart. They (like those at Vicenza) are secured by iron rods; but in this case the rods are introduced differently in alternate ribs, the first at the springing, and the second part of the way up, and so on.

Roofs with ribs did not, however, become common till a much later

date. The next example that I have to quote is a roof which was erected over the Corn Market in Paris in the year 1662. This building is circular, and about one hundred and thirty feet in diameter. The present roof is a dome-shaped one on iron ribs, interesting as an early example of the application of iron to roofing, but the



Roof of the Corn-Market. (*Halle au Blé.*)

original timber roof, which was also dome-shaped, is the one with which we are at present concerned. It was destroyed by fire in 1802. A good account of its construction is given by Mr. Tarn in his excellent little treatise on roofs of wood and iron: "The circular ribs consisted of planks nine feet long, thirteen inches broad and three inches thick; each rib consisted of three of these planks bolted together in such a manner that no two joints met. A rib was begun, for instance, with a plank three feet long, standing between one of six feet and another of nine feet, and that was continued to the head. No machinery was needed for hoisting such small pieces, and the whole went up like a piece of brickwork. At various distances these ribs were connected horizontally by purlins and iron straps, which made so many hoops to the whole dome. Some of the ribs were discontinued part of the way up. Near the top those that were continued were framed into a circular ring of timber which formed a large eye in the middle, over which was an umbrella-shaped glass roof."

CRAZY ROOFS AND ROOFS SENSIBLE.

BOSTON, May 16, 1885.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Since Professor Edward S. Morse invented his "Sun Heater," by means of which he saves coal in his own house, and has also succeeded in devising a method of ventilating churches throughout the week days, during which term they are closed, my attention has been called to the analogy between the "Sun Heater" and the roof of a country house as commonly constructed. Professor Morse has disavowed any special scientific knowledge of physics or of the laws of heat; it will, therefore, be suitable for me to call attention to the subject of roofs of dwelling-houses, while disavowing any scientific knowledge whatever of physics or of the laws of heat, and being capable of giving only the results of observations derived from the supervision of factories.

In presenting these views I may challenge discussion by a somewhat aggressive method of presenting the case.

An exhibition has lately been in progress in Horticultural Hall under the title of the "Crazy Quilt Show." The writer did not visit it, but assumed that it contained a large number of examples of wasted material and wasted labor in the form of patch-work and of art, so called, badly done in crewels, well named crewel (cruel) in more senses than one. The writer suggests that this hall be presently engaged for a "Crazy Roof Show," in which may be exhibited a large number of the designs which have lately been adopted in the construction of the roofs of country houses during the period of the so-called Queen Ann craze. He doubts if so many examples of the misuse of materials and of thoroughly bad design could be found even among the crazy quilts.

It would seem to be most necessary to put the elementary question, What is the object of a roof? at the beginning of a treatise upon the subject and to define the end sought.

The objects of a roof are as follows: — *First*, to keep rain-water out of a house. The crazy roofs fail to do this effectually. *Second*, to prevent the snow collecting on the roof of a house. The crazy roofs fail to do this. *Third*, to keep the heat of summer out of the house. The crazy roofs fail to do this. *Fourth*, to keep the warmth generated by the consumption of coal within the house in winter. The crazy roofs fail to do this.

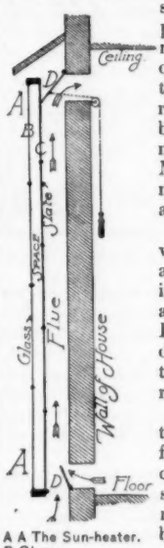
What do they accomplish? Almost nothing for which a roof is intended; but this much may be said in their favor: they form a fitting superstructure to a shingle palace which in most other respects beside the roof is unsuitable to the climate or to the surroundings of New England.

The house which is customarily covered by the crazy roof has neither dignity, repose, nor any air of comfort about it. Windows which are commonly supposed to be intended at least in part to admit light within, have gaudy stained-glass in the wrong place—at the top, where they exclude the light at the most important point. There is no appearance of solidity or stability about the house, and as soon as it begins to become shabby, which is within a very short period after it has been finished, it becomes as shabby as possible. In the slang of the university: —

> "When they are *fresh*
> They are very, very fresh,
> And when they are shabby
> They're horrid."

Compare one of these perky, pretentious, intrusive, shabby-genteel "residences," so called, with the comfortable old dwelling-houses of our grandfathers, and mark the contrast. One wants to write a new version of "The Devil's Walk" in order to include them in it. Of course, these epithets apply to only a portion of the new houses; many, and perhaps we might say most of the later structures are excellent in their way.

The old dwelling-house had as true a roof upon it as the condition of the arts of that day permitted. The house faced the south, two stories in the front with a very short slope of roof presented toward the hot sun, but toward the north it sloped back nearly down to the ground, over the lean-to, back of the kitchen away from the sun. It was well constructed of good materials, put together by true joiners, who joined the boards and closed the cracks. It was not like the modern roof, a *sun-heater in summer*, from which Mr. Morse might have borrowed his invention; neither was it a refrigerator in winter, as our roofs are apt to be, especially when covered with slate.



A A The Sun-heater.
B Glass.
C Slate.
D D Valves by the operation of which the outer air may be drawn into the room above, or the air of the room may be drawn out below.

I will now venture to describe the kind of roof which might be made use of to the great comfort and welfare of those who occupy dwelling-houses, if the experience of the factory can be made of any value in the construction of the dwelling. In relating this experience I may again rightly declare that I can give no scientific explanation of the facts. What I shall state will simply be a narrative of facts.

First, it has been the conviction of the executive officers of the Factory Insurance Companies for many years that no material can be made use of which is so complete a non-conductor of heat as solid wood, when used in sufficient mass. This is now becoming the conviction of most of our members, although some of them still adhere to what we can only call a superstition, in favor of an air-space, even in a roof of which the principal part is composed of thick plank. We admit the non-conducting qualities of an air-space, provided it can be hermetically sealed or very nearly so; but this cannot be accomplished in the construction of a roof, therefore when it is proposed to make a roof of two-inch plank, one-inch air-space and one-inch sheathing, we advise either three-inch solid plank, or that the sheathing be nailed close to the under side of the two-inch plank between the timbers and crossway to the lines of the plank. We hold that in this way the non-conduction of heat will be more than equal to the other, and there will be no danger of the humidity generated in the building passing into the air-space and there condensing to the gradual deterioration both of the plank and of the sheathing.

Second, it has been conclusively proved that a solid *deck* made of three-inch plank grooved and splined, flat or with a rise not exceeding half an inch to the foot, will shed water as well as a pitched roof, and will *not* accumulate snow in so great a measure as the roofs of irregular form with many valleys, even if covering a building four hundred feet long and two hundred feet wide with crossway monitors or lanterns for light and ventilation at every other bay — the bays being either eight feet or ten feet four inches in width, as the heavy timbers of the frame may be placed.

Third, the suggestion that the heating of such buildings by means of steam-pipe would be secured in the most perfect and least costly manner, by hanging the pipes *overhead*, away from the side walls, rather than by placing them below the windows along the side walls, is now so fully and generally accepted as to be no longer an open question.

I mention this fact in regard to the starting point of the heat from overhead by artificial methods in order to illustrate the unsuitable character of the crazy roofs which I have described.

The crazy roof bears a very close analogy to the "Sun Heater," and we will consider it by analogy. It consists first of the rafters,

say eighteen inches on centres eight to ten inches deep. These rafters are supported at the upper end against a board which cuts off the connection at the top, between one side of the roof and the other in very many or most cases. On the outside unmatched boards are nailed with many and wide cracks between them. These boards are then covered with shingles. The interior is sometimes back-plastered between the rafters — more often plastered directly upon the rafters. Slates may be counted out, as they are now seldom used in country houses, but the shingles are apt to be painted a dark color. When a great expanse of roof of this sort is exposed to the hot southern sun there is little doubt that the interspace, between the boarding and the plastering, becomes excessively hot; the dark color of the shingles attracts the heat, and they being very thin the heat passes through, and then passes between the cracks of the boarding, and may be said to accumulate in the interspace as in the "Sun Heater."

It would be interesting to have a series of observations taken with the thermometer under these conditions. According to our experience in the observation of factories it would be found that the heat in this interspace, on a bright hot summer day, would be very nearly equal to that of the direct heat of the sun's rays. The air would thus be expanded in the interspace and the passage to the back side of the roof being cut off by the ridge-pole or ridge-board previously named, the expansion will force the heat downward through the interspaces in the vertical walls of the house, thus converting the house into an oven completely heated from the air-spaces in roof and wall.

We infer that this course will be taken by the heat by analogy with the overhead system of heating; for instance, in practice it has been found that a basement of a mill furnished with a stone floor had been so cold to the feet of the operatives while the pipes were at the sides of the room as to be unfit for use, and has been made perfectly comfortable in all respects when the same pipes were placed overhead and a chance was given for bottom ventilation, the heated air from above forcing the cold air out and warming both the room and the floor.

My theory, which is justified by my observations in my own house, is this: The air-space in the roof, instead of obstructing the passage of heat as a two-inch plank plastered solid inside would do, serves to accumulate heat which expands and forces its way downward in the air-spaces of the walls.

In winter the heat generated within the house passes through the plastering into the vertical air-spaces in the wall, passes up to the air-spaces of the roof and out through the cracks of the boards and shingles; this current serves to suck in cold air from below or the foul air from the cellar into the air-spaces of the walls and of the roof.

Thus, the only effective non-conducting substance is the plastering — all the boards both of roof and walls failing for want of being thick enough or tight enough to serve a useful purpose as non-conductors.

If this theory is well grounded these air-spaces, which are not hermetically sealed, are a snare and a delusion. Who really knows whether this is so or not? What architects have made any observations? What hollow-walled or "air-spaced" wooden house is equal to a log house in this matter?

Now, in the construction of the crazy roof a sufficient quantity of wood is used in the rafters and the boards to serve for the covering of a well-planned hipped roof over the same number of superficial feet, with plank two inches thick, grooved and splined. If such plank be laid on timbers placed five feet on centres and protected within by a single coat of plastering laid solid against the plank between the timbers, the attic may be made the coolest room in the summer and the warmest room in winter — instead of being converted into an oven in summer and a refrigerator in winter, according to the common custom.

Yet better, if upon such a hipped roof, the plastering be laid outside in the form of a half-inch coat of mortar and then shingled over the mortar, the shingles themselves will last about twice as long and the roof itself will even be a better non-conductor of heat than when constructed in the other way.

I submit these views for just what they are worth, with the hope that in view of the great progress which is being made by sensible architects toward safe and suitable construction, these lessons derived from the factory may be considered.

But there is one other point to which I desire to call attention. We have become accustomed to forms of roof on country dwelling-houses which were the necessary forms so long as there was no suitable covering for a flat roof in existence; but so far as I have read, I observe, without ever having visited Eastern hot countries, that the customary roof in all hot climates is a thick *flat* roof, which is made use of as a place of resort in hot summer evenings for air and recreation. It seems to me that in the close suburbs of cities where small dwelling-houses must of necessity be placed on small lots of land, that there is a great waste of opportunity for lack of consideration of the merits of flat roofs. In place of the one or two story dwelling-houses covered by the crazy roof, why might not the house be covered with a deck, that deck being covered with painted duck like the deck of a steamboat, so that it could be used as a place of resort for relief from the heat during our intense summer weather?

We have the record of a part of a duck mill in Plymouth which had been covered with painted duck for twenty-seven years, and when the mill was taken down the duck roofing was in as good condition as when first put on. If duck is placed upon crazy roofs the humidity will pass from the house through the cracks and rot it in the under side; but if properly placed over a well-constructed flat deck it may be kept in good condition longer than almost any other material. And if such a deck-roof is suitable for the small dwelling-house, why not for the larger dwelling-house, even where there is plenty of land? Is there anything against it except appearances? Are not appearances against it merely because we have become habituated to other forms?

May it not be the function of the true architect to evolve a dwelling-place which shall be suitable to the conditions of climate in which we live? Of such a dwelling a thick deck-roof would be in all but appearance the very best.

Cannot the true architect give breadth, repose and comfort to some form of structure which will make the roof the pleasantest place in the hot summer evening?

Why waste such a place upon the crazy roof which covers the crazy shingle palace of these modern days?

In order that the analogy between the common roof and the sun-heater may be fully comprehended, I have added a diagram of the latter, which has been kindly furnished by Professor Morse. Permit me to call the attention of architects to the probably great value of this invention, for which Professor Morse holds the patent, in its application to churches. If placed on the south side it will be likely to work three or four sunny days in each week, and on each day that it works the air of the church will be changed several times a day, — the advantage is apparent.

Yours truly, Edward Atkinson.

NOTES AND CLIPPINGS.

A Queer Superstition. — Abram Reed, a farmer living in Beaver township, Pa., cut down a large oak tree on his farm, and in cutting it up he found, imbedded in the trunk, seven or eight feet from the ground, a small glass bottle and what had the appearance of a lock of hair. The bottle had been inserted in a hole in the tree made by an auger, then a pine plug was driven into the hole over the bottle, the hair also being held in the hole by the plug. The bottle was corked, and contained a colorless liquid. Over the plug had grown six solid rings of wood, beside the thick bark. There was a superstition among the early settlers, and it is held by many of their descendants, that asthma and other affections could be cured by the victim standing against a tree and having a lock of his hair plugged in it while the hair was still attached to his head. It must then be cut off close to his head, and the afflicted person walk away without looking at it or ever passing by the tree again. While the use of a bottle was not included in this treatment, it is believed that the one with the hair discovered in the heart of the oak tree was put there in the early days of the settlement by some believer in the superstition to cure an ailment of some kind. — *Lumber World.*

Frescoes found in Rome. — Archæological discoveries of importance are rapidly succeeding each other here. That within the limits of the Temple of Vesta illustrating the rites performed there has been followed by another, made within the distance of a few yards, connected with the Christian Church and the ecclesiastical history of the tenth century (*circa*). It will be remembered that immediately behind the remains of the Temple of Castor and Pollux, and adjoining the Church of Santa Maria Liberatrice, there stand the colossal walls of an edifice of brickwork of the finest imperial construction. What it was no one ventured to pronounce. The late Mr. J. H. Parker maintained that one of the walls belonging to it was part of the celebrated bridge built by Commodus across the Forum from his *domus* on the Palatine to the Temple of Jupiter Capitolinus. Others have thought that these walls might be the remains of the temple dedicated to Augustus, which was somewhere in this vicinity. But these theories must be dismissed, together with others propounded in times past. Within and against the walls of this mysterious relic of imperial magnificence a number of hay-lofts have been built, hiding them almost entirely, except where they towered above the modern roofs. These hay-lofts, the ground floors of which were occupied by wrights and carpenters, are now in process of being demolished. Already the area of one great hall, with large niches for statues in it, and far exceeding in dimensions and grandeur any of the remains of the Forum adjoining it or of the Palace of the Cæsars above it, has been cleared. It was soon seen that the flooring almost corresponding with the modern level was of recent date. It was cut through. The original flooring was found at a depth corresponding with the level of the Forum itself. One-half of this hall has been further cleared down to that level, and from it opens a passage, the walls and ceiling of which are covered with comparatively uninjured fresco paintings representing Christian saints standing in rows on one side and the other, while on the face of the wall of the hall itself are remains of similar frescoes, indicating that it had been completely decorated in the same manner. The Commendatore de Rossi attributes these frescoes to the tenth or eleventh century, but for the present reserves any further opinion beyond that which he put forth in a tentative manner, with reference in part proof of it in a paper written by him on the eight hundred Anglo-Saxon coins discovered in a jar two years ago close to the House of the Vestals. This opinion was to the effect that at the time those coins were sent to Rome the imperial buildings along that side of the Palatine were occupied by the Pontiffs as their residence and by the officers of the ecclesiastical Government as the Vatican is now. We must wait for the completion of Signor de Rossi's studies and researches regarding this interesting subject. But in the meantime one may be tempted to suppose that we see in this wall of an unknown edifice of one of the first Cæsars the hall, perchance, of the Consistory of the time of Alfred the Great, whose money was found near it. The completion of the excavations will, it is hoped, throw full light on the original nature of this grand edifice of pagan Rome and the later use to which it was applied in Christian days. — *Rome Dispatch to the London Times.*

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.]

BUILDING PATENTS.

[Printed specifications of any patents here mentioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.]

317,265. METHOD OF PREVENTING THE FORMATION OF ICE ON SHOW-WINDOWS.—Edwin A. Wood, Utica, N. Y.

317,294. CHIMNEY-CAP. — Charles W. Carll, Camden, N. J.

317 321. SASH-FASTENER. — Patrick J. Donohue, Chicago, Ill.

317,333. COMBINED WASH AND BATH TUB.—Julia B. French, Boston, Mass.

317,337. METHOD OF REPAIRING WITH BETON OR CONCRETE.—John C. Goodridge, Jr., New York, N. Y.

317,338. PROCESS OF CONSTRUCTION AND REPAIR WITH BETON OR CONCRETE. — John C. Goodridge, Jr., New York, N. Y.

317,351. BRICK-KILN. — Thos. S. Hawkins, Chattanooga, Tenn.

317,352. HOLDER FOR SLIDING-DOORS. — William E. Haycox, Cleveland, O.

317,373. WASTE-PIPE FOR WASH-BASINS, BATH-TUBS, ETC.—Oliver H. Keep, New York, N. Y.

317,381. IRON ROOFING. — William C. Langenau, Cleveland, O.

317,398. LOCK.—Philip Mathes, Idlewood, Pa.

317,410. SPRING-HINGE. - Sidney S. Niles, Chicago, Ill.

317,414. DEVICE FOR FASTENING ROOF-TILES. — Fawcett Plumb, Streator, Ill.

317,440. PROCESS OF PRESERVING WOOD.—Joseph P. Card, St. Louis, Mo.

317,456. WINDOW-SCREEN.—Alexander H. Hill, Oskaloosa, Iowa.

317,485. WINDOW-AWNING. — Thomas L. Barlow, Boston, Mass.

317,496. DOOR-HANGER.—Charles W. Bullard, Chicago, Ill.

317,505. FLUSH-TANK FOR WATER-CLOSETS, SEWERS, ETC.—Winfield S. Chaplin, Schenectady, N. Y.

317,517. COMBINED STRAIGHT-EDGE AND GAUGE. —Milo Covel, Chicago, Ill.

317,524. HOLLOW AUGER. — George W. England, Merrimac, Mass.

317,534. FIRE-ESCAPE. — Christopher Hoell, St. Louis, Mo.

317,540. FASTENING FOR MEETING-RAILS OF SASHES.—Hobart B. Ives, New Haven, Conn.

317,547. LOCK.—Thomas Kirwan, Boston, Mass.

317,548. PINCH-BAR.—Charles Klaus, Chicago, Ill.

317,550. PENCIL-SHARPENING MACHINE.—Warren H. Lamson, Lynn, Mass.

317,564. ELEVATOR-HATCHWAY GUARD. — Walter S. Morton, St. Paul, Minn.

317,613. LAG-SCREW FOR PIPE-HANGERS.—George W. Blake, New York, N. Y.

317,630. DOOR SADDLE OR SILL. — James A. Cramer, Morristown, N. J.

317,634. DISINFECTING WATER-CLOSETS.—William M. Ernst, New York, N. Y.

317,659. WINDOW-SASH. — Emil R. Mayer, New York, N. Y.

317,684. FLOOR-TUBE.—Abel G. Stilson, Cobleskill, N. Y.

317,701. REVERSIBLE HINGE. — Jacob F. Aston, Watsonville, Cal.

317,704. FIRE-ESCAPE. — Edmond Beale and Andrew Bangs, Philadelphia, Pa.

317,710. FLOAT-VALVE FOR WATER-CLOSETS.—August F. Blesch, Columbus, O.

317,715. REAMER.—Jesse H. Brown, Syracuse, N. Y.

317,717. WATER-CLOSET. — William Bunting, Jr.,

SUMMARY OF THE WEEK.

Baltimore.

WAREHOUSE. — Chas. L. Carson, architect, has prepared plans for the McCreery Building, which will front 100′ on Sharp St., 110′ on German St., and 74′ on Liberty St., be built of brick, stone and iron, six stories and basement; cost, $150,000; W. T. Markland & Bros., builders.

BUILDING PERMITS. — Since our last report forty permits have been granted, the more important of which are the following: —

Geo. H. Strott, three-st'y brick building, w s Parrish Alley, between Mosher and Tennant Sts.

David Kruse, three-st'y brick building, w s Parrish Alley, between Mosher and Tennant Sts.

B. Baron, one-st'y brick building, s s Pratt St., between Exeter and Canal Sts.

Jas. L. Bowen, 16 two-st'y brick buildings, s e s Bowen St., s w from Cross St.

E. Pohl, 2 three-st'y brick buildings (square), w s Diamond St., between Saratoga and Mulberry Sts.

F. D. Forrester, 3 three-st'y brick buildings, w s McCulloh St., commencing n w cor. Robert St.; and 2 three-st'y brick buildings (square), n s Robert St., w of McCulloh St.

S. H. Lucas, three-st'y brick building, n s Pierce St., between Pine and Pearl Sts.

W. T. Phillips, 7 three-st'y brick buildings, w s Gilmore St., n of Baltimore St.

S. B. Seaton & Co., three-st'y brick building, n s Barre St., between Greene and Warner Sts.

Henry Schamburg, 5 two-st'y brick buildings, w s Russell St., between Cross and Hamburg Sts.

A. A. Rinehart, 5 three-st'y brick buildings and mansard, w s Eutaw Pl., between North Ave. and Bloom St.

G. C. Herschman, 27 two-st'y brick buildings, w s Patterson Park Ave., between Orleans and Jefferson Sts.

L. O. Chappell., three-st'y brick building, n s Mulberry St., between Pearl and Pine Sts.

Morgan & Bro., 8 two-st'y brick buildings, e s Etting St., s of Bloom St.

Henry Lange, 4 two-st'y brick buildings, w s Chester St., between Eager St. and Union Railroad.

Boston.

BUILDING PERMITS.—*Brick.—Wellington St., No.* 26, apartment-house, 24′ and 27′ x 53′; owner and builder, Geo. S. Hewitt.

South St., No. 143, mercantile, 78′ 8″ x 105′ 2″; owner and builder, J. F. J. Faxon.

Beach St., No. 114, mercantile, 73′ 7″ x 91′ 9″; owner and builder, same as last.

Cabot St., No. 131, cor. Weston St., tenement, 55′ x 30′ and 67′; owner, John Nichols; builder, Fajah Jackson.

Endicott St., Nos. 183-187, cor. North Margin St., 3 dwells., 21′ 6″ x 35′; owner, D. McLaughlin.

Hampden St., Nos. 106 *and* 108, dwell. and store, 22′ x 43′; owner, John Y. Supple; builder, James Small.

Isabella St., tenement, 42′ x 60′; owner, H. M. Currier.

Brooklyn.

BUILDING PERMITS. — *Broadway*, s e cor. Adams St., three-st'y brick office, salesroom and refrigerating-building, tin roof; cost, about $7,000; owner, E. C. Swift, Lowell, Mass.; architect, S. E. Goodrich; builder, B. F. Bailey.

Jefferson St., Nos. 132 *and* 134, s e s, 225′ n e Central Ave., 2 three-st'y frame tenements, tin roofs; cost, each, $3,800; owner and builder, Casp. Gossmann, 138 Ellery St; architect, E. Schrampf.

Greenpoint Ave., No. 209, three st'y frame tenement (brick-filled), tin roof; cost, $3,500; owner, Peter Dougherty, 209 Greenpoint Ave.; builder, D. O'Keefe; architect, F. Holmberg.

De Kalb Ave., n s, 330′ e Raymond St., three-st'y attic brick and Pleasant Valley brown-stone mission and dwell., metal and slate roof; cost, $3,500; owner, A. A. Low, 3 Pierrepont Pl.; architects, Parfitt Bros.; builder, L. W. Seaman.

Sullivan St., s s, 80′ e Richard St., 2 three-st'y frame tenements, tin roofs; cost, $6,650; owner, T. Gerrethe, on premises; architect and contractor, C. M. Detifsen; mason, T. Kelly.

Fifth Ave., n w cor. President St., 4 three-st'y brick dwells. and tenements, gravel roofs; cost, $30,000; owner and mason, Wm. Corrigan, 233 Eleventh St.; architect and contractor, P. Corrigan.

Nostrand Ave., e s, 54′ 1″ n Atlantic Ave., 3 two-st'y brown-stone dwells., tin roofs; cost, each, $4,000; owner, James O. Carpenter, 120 New York Ave.; architects, Geo. P. Chappell & Co.; builders, J. Ashfield & Son and Powderly & Murphy.

Macon St., s s, 309′ e Nostrand Ave., three-st'y brick dwell., slate and tin roof; cost, $8,000; owner, Frank Seaman, 182 Rodney St.; architect, A. O. Haddick; builder, W. J. Moran.

Clark St., Nos. 551-555, n s, 100′ from Hicks St., eight-st'y hotel and apartment-house, mansard roof; cost, $170,000; owner, W. Tumbridge, 78 Hicks St.; architect, A. Hatfield.

Schenck St., w s, 100′ n Myrtle Ave., two-and-a-half-st'y frame (brick-filled) dwell., gravel roof; cost, $4,000; owner, Frank Ward, 375 Myrtle Ave.; architect and builder, J. T. Hanlon.

Throop Ave., w s, 23′ n Lexington Ave., 4 two-st'y brick dwells., tin roofs, wooden cornices; cost, $18,000; owner and builder, John McDikken, 282 Marion St.

India St., No. 86, s s, e of Franklin St., three-st'y frame (brick-filled) tenement, gravel roof; cost, $5,000; owner and contractor, Dennis Devine, on premises; architect, F. Weber; mason, J. Hafford.

St. Mark's Ave., s s, about 125′ w New York Ave., three-st'y brick and stone dwell., slate and tin roof; cost, about $15,000; owner, Wm. H. Addoms, Cliff St., New York; architect, H. P. Fowler; builders, Jas. Ashfield & Son and Morris & Selover.

Adams St., w s, 80′ n Myrtle Ave., five-st'y brick police court house, tin and slate roof; cost, $45,228; owner, City of Brooklyn; architects, Parfitt Bros.; builder, P. J. Carlin.

Dean St., n s, 95′ e Washington Ave., three-st'y brick armory-building, tin roof; cost, about $50,000; owner, King's County; architect, R. Dixon; builders, H. D. & W. A. Southard.

Quincy St., n s, 85′ e Reid Ave., 12 two-and-a-half-st'y brown-stone dwells., tin roofs; cost, each, $5,500; owner, Mrs. R. Gill, 201 Keap St.; builder, J. Roper.

Reid Ave., n e cor. Hancock St., three-st'y brown-stone store and dwell., tin roof; cost, $12,000; owner, Chas. H. Althaus, 466 Carlton Ave.; architect, Carl F. Eisenach; builders, J. J. Gallagher and F. D. Norris.

Monroe St., n s, 100′ e Lewis Ave., three-st'y brick dwell., tin roof, wooden cornice; cost, $4,800; owner, Mrs. Marcia De Castro, 257 Lewis Ave.; architect, J. S. Stevens; builder, M. Reynolds.

Bushwick Ave., No. 200, e s, 60′ s Ten Eyck St., three-st'y frame (brick-filled) tenement, tin roof; cost, $3,500; owner and builder, Joseph Amrein, on premises; architect, Th. Engelhardt.

Park Ave., n e cor. Carlton Ave., 3 four-st'y brick stores and tenements, tin roofs; cost, $18,700; owner, L. M. Goldrick, 95 Clinton St.; architect, M. J. Morrill; builders, P. J. Carlin and Long & Barnes.

Central Ave., No. 33, e s, 30′ n Prospect St., three-st'y frame tenement, tin roof; cost, $4,300; owner, Joseph Wendel, 34 Central Ave.; architect, Th. Engelhardt; builder, D. Kreuder.

Third Ave., e s, 20′ 2″ s Thirty-eighth St., 2 four-st'y brick tenements, tin roofs, wooden cornices; cost, each, $8,500; owner and architect, John H. O'Rourke, 119 Thirty-eighth St.; builders, John Anderson and J. H. O'Rourke.

Chicago.

BUILDING PERMITS. — *J.* Hulka, two-st'y store and dwell., 911 West Nineteenth St.; cost, $3,800.

J. H. Wilson, two-st'y dwell., 31 Brown St.; cost, $4,000.

J. Koch, two-st'y dwell., 3153 Wentworth Ave.; cost, $4,500.

Church of the Epiphany, one-st'y church, Ashland Ave. and Adams St.; cost, $50,000.

S. Sutter, three-st'y store and flats, 395 Ogden Ave.; cost, $5,000; architect, Wm. Strippelman.

T. O'Connell, two-st'y dwell., 87 McAlister Pl.; cost, $5,000; architect, W. H. Drake.

C. Gevne, three-st'y flats, 143 Erie St.; cost, $10,000; architect, H. Hanson.

C. H. Holenberg, three-st'y dwell., 263 West Ohio St.; cost, $3,500.

J. Lohstein, two-st'y dwell., 404 to 406 Morgan St.; cost, $5,000.

Wm. Wagner, three-st'y dwell., 251 Bissell St.; cost, $6,000.

Mrs. M. T. Topping, two-st'y store and dwell., 495 West Randolph St.; cost, $3,500.

N. Eckhardt, three-st'y store and dwell., 448 West Chicago Ave.; cost, $9,000.

J. F. Sheridan, 2 two-st'y dwells., 481 to 483 Ashland Ave.; cost, $9,000.

J. H. Webber, three-st'y store and dwell., 474 Larrabee St.; cost, $6,000.

E. Klein, three-st'y store and dwell., 791 Halsted St.; cost, $10,000.

J. & P. A. Otis, five-st'y store and flats, 294 Clark St., cost, $15,000; architect, T. V. Wadskier.

M. Hayes, two-st'y dwell., 2447 Wabash Ave.; cost, $3,000.

Mrs. R. Heacon, two-st'y dwell., 787 Monroe St.; cost, $5,000; architect, H. Copeland.

A. Kaler, two-st'y dwell., 646 Nineteenth St.; cost, $2,800.

J. Kezek, two-st'y dwell., 757 Loomis St.; cost, $2,900.

Mrs. H. Mathison, three-st'y flats, 61 West Huron St.; cost, $6,000; architect, G. Isaacson.

Mrs. A. Rennie, two-st'y store and dwell., 921 West Twenty-second St.; cost, $2,800.

M. Blake, two-st'y dwell., 589 Taylor St.; cost, $3,300; builder, M. Hanley.

C. Munostock, three-st'y store and dwell., 150 Bissell St.; cost, $5,000; architect, Thomson.

O. Smith, three-st'y dwell., 41 Bellevue Ave.; cost, 8,000; architects, Treat & Foltz.

Sage & Sullivan, two-st'y barn, 210 to 212 Chicago Ave.; cost, $3,200.

G. Fachs, two-st'y dwell., 605 Dearborn Ave.; cost, $10,000.

S. P. Redfield, two-st'y dwell., 54 Thirty-fifth St.; cost, $7,000; architects, Treat & Foltz.

N. Johnson, two-st'y dwell., 717 Maplewood Ave.; cost, $2,500.

C. H. Fuller, two-st'y dwell., 370 Warren Ave.; cost, $6,000; architect, C. C. Miller.

A. Lemington, two-st'y dwell., Oak Ave.; cost, $3,500.

Wm. McAuliffe, two-st'y dwell., 378 Fourteenth St.; cost, $3,000.

M. Griffiths, 2 two-st'y dwells., 289 Leavitt St.; cost, $6,000.

C. Hagensen, two-st'y dwell., 186 Evergreen Ave.; cost, $2,500.

H. A. Hansen, three-st'y dwell., 36 Evergreen Ave.; cost, $6,000.

J. J. Phelan, three-st'y store and dwell., 316 Twelfth St.; cost, $8,000; architect, P. W. Ruehl.

G. P. Brown, two-st'y dwell., 672 Lasalle Ave.; cost, $15,000; architect, L. G. Hallberg.

H. S. McLean, 2 two-st'y dwells., 100 to 102 Laflin St.; cost, $7,000; architect, C. C. Miller.

T. Biddie; four-st'y store and flats, 188 to 190½ North Clark St.; cost, $20,000; architect, E. Baumann.

M. Quinn, two-st'y store and dwell., 1231 Western Ave.; cost, $4,600.

T. J. Myers, two-st'y addition, 3815 Ellis Ave.; cost, $4,000.

C. B. Farwell, four-st'y addition, Jackson and Halsted Sts.; cost, $15,000.

Breycha & Long, 2 three-st'y dwells., 104 to 106 Bunker St.; cost, $8,500.

F. Rozlik, three-st'y dwell., 292 Fourteenth St.; cost, $6,500.

H. Ramaker, two-st'y dwell., 636 West Harrison St.; cost, $5,000.

D. H. Hammar, two-st'y dwell., Thirty-seventh St. and Grand Boulevard; cost, $15,000.

E. Johnson, three-st'y dwell., 232 May St.; cost, $6,000.

J. A. Sexton, two-st'y dwell., 561 Lasalle Ave.; cost, $5,000; architect, S. M. Randolph.

J. Schroer, two-st'y dwell., 2918 Honore St.; cost, $8,000.

P. Mattes, three-st'y flats, 415 Belden St; cost, $5,000; architect, D. F. Holz.

B. Stucker, three-st'y flats, 319 Lincoln Ave.; cost, $6,000; architects, Furst & Rudolph.

G. Lindholm, two-st'y barn, 356 Indiana St.; cost, $2,500.

J. A. Raap, two-st'y dwell., 648 North Hoyne Ave.; cost, $15,000; architect, H. Kley; builder, W. Mueller.

Cook & Hill, 2 two-st'y dwells., 3239 Groveland Pk.; cost, $12,000; architect, J. N. Tilton.

Wm. Powers, two-st'y dwell., 203 Chestnut St.; cost, $4,000; architect, J. Otter.

J. Eidenwick, three-st'y dwell., 172 Fourth Ave.; cost, $5,000; architect, G. Vigeant.

Geo. Arnold, two-st'y dwell., 208 Lasalle Ave.; cost, $5 000.

Cincinnati.

BUILDING PERMITS. — C. H. Gould, 2 two-st'y frame buildings, Lane St.; cost, $5,000.

Jos. Austermohr, three-st'y brick building, Liberty St.; cost, $7,000.

C. Windisch, three-st'y brick building, Sixth St., near Smith St.; cost, $6,000.

Henry Boenforder, two-st'y brick building, s s Dayton St.; cost, $6,000.

H. Sahlfeld, Main St., opposite Abigail St., five-st'y brick building; cost, $6,000.

Richter & Co., Ninth St., between Sycamore and Main Sts.; cost, $8,000.

Repairs and additions, costing $2,500.

Total permits to date, 315.

Total cost to date, $1,236,500.

Kansas City, Mo.

Building Permits.—M. Dircky, brick house, 616 West Tenth St.; cost, $3,000.

P. H. Smith, brick house, Wyandotte St.; cost, $3,000.

Stump & Peltzer, block of six brick houses, two-and-one-half-st'y; cost, $15,000.

O. C. Day, brick house, cor. Ninth St. and Forest Ave.; cost, $6,500.

George M. Myers, brick and terra-cotta house; cost, $10,000.

D. C. King, brick house, Baltimore Ave.; cost, $4,000.

Minneapolis, Minn.

Building Permits.—James Pauly, three-st'y brick and stone hotel building, High St. and Bridge Sq.; cost, $12,000.

Henry Downs, two-and-one-half-st'y double wooden dwell., n w cor. East Seventeenth St. and Park Ave.; cost, $7,500.

J. H. and J. W. Paul, two-st'y brick store building, w cor. Twentieth St. and Eighth Ave., n; cost, $4,000.

Cook Bros., brick store and office building, cor. Fifth street and Hennepin Ave.; cost, $100,000.

M. V. Kinney, two-st'y wooden dwell. and barn, Stevens Ave., bet. East Thirty-first and East Thirty-second Sts.; cost, $4,800.

Alice M. Spink, 5 two-st'y brick stores and flats, cor. Fifth St. and Cedar Ave.; cost, $10,000.

Andrew Bergstrom, two-st'y wooden dwell., e s Ninth St., cor. Sixteenth Ave., s; cost, $3,000.

Chester Simmons, two-st'y wooden dwell., s w s Seventh Ave., s, bet. Nineteenth and Twentieth Aves.; cost, $7,000.

J. S. Sinnott, two-st'y dwell., cor. Sixth Ave. and Eighteenth St.; cost, $4,000.

James Pye, two-st'y double dwell., cor. Birch and Tenth St., n; cost, $3,500.

Ole Olesen, two-st'y double brick store, Plymouth Ave., bet. Fifth and Sixth Sts., n; cost, $8,000.

Judge M. B. Coon, two-st'y brick store, cor. Franklin and Twelfth Ave., s; cost, $4,500.

Edward Hanson, addition to hotel, 353 and 355 Fourth Ave., n; cost, $4,000.

Donald Kennedy, two-st'y brick dwell., Park Ave., bet. Twenty-second and Twenty-fourth Sts.; cost, $28,000.

Mrs. G. E. Foster, two-st'y wooden dwell. and barn, Talmage Ave. and Thirteenth St., s e; cost, $6,000.

R. L. Stillman, brown-stone store and office building, 19, 21, and 23 Fourth St., s; cost, $80,000.

W. T. Coffum, five-st'y brown-stone store and office building, 25, 27, and 29 Fourth St., s; cost, $60,000.

S. M. Klarquist, two-st'y brick veneer dwell., Fifteenth Ave., bet. East Nineteenth and Twentieth Sts.; cost, $5,000.

Campbell Bros., two-st'y wooden dwell. and barn, cor. Aldrich Ave. and West Twenty-fifth St.; cost, $4,000.

C. A. Anderson, two-st'y wooden dwell., Hennepin Ave., bet. West Twenty-seventh and Twenty-eighth Sts.; cost, $3,500.

E. G. Falk, two-st'y dwell. and barn, First Ave., bet. East Thirty-first and East Thirty-second Sts.; cost, $3,700.

Howard A. Hinkle, four-st'y brick store building and warehouse, 66′ front, n e s Second St., bet. Second and Third Aves.; cost, $30,000.

New York.

The New Building Law.—The Mechanics' and Traders' Exchange, at a special meeting held last week, appointed a committee of five to wait on Governor Hill and protest against the building law as passed by the legislature.

Hotel.—The Buckingham Hotel, on the s e cor. of Fifth Ave. and Fifteeth St., is to be extended, at a cost of $175,000, for the owner, Mr. Geo. Kemp.

Stores.—The Trinity Church Corporation will have erected, from plans of Mr. Chas. C. Haight, 5 three-st'y and cellar buildings, on the s e cor. of Varick and King Sts.

Building Permits.—*West Thirtieth St., No.* 526 five-st'y brick tenement, tin roof; cost, $14,000; owner, architect and builder, Thos. P. Dunne, 364 West Fifty-first St.

Thirty-fourth St., s s, 125′ e Twelfth Ave., two-st'y brick stable and loft, gravel roof; cost, $4,000; owner, N. Y. Packing Co. (Limited) on premises; builders, Marc Eidlitz & Son.

East Forty-fourth St., No. 245, five-st'y brick brown-stone front tenement, tin roof; cost, $9,000; owner, Mary E. Taylor, 247 East Forty-fourth St.; architects, A. B. Ogden & Son.

Forty-eighth St., n s, and *Forty-ninth St.*, s s, 81′ 6″ e Tenth Ave., 2 five-st'y brick tenements, tin roofs; cost, each, $10,000; owner, Wm. Rankin, 332 West Forty-seventh St.; architect, M. Louis Ungrich.

West Fiftieth St., No. 363, five-st'y brown-stone front flat, tin roof; owner, John Buckie, 363 West Fiftieth St.; architect, R. H. Bschaidner; builders, John P. Schweikert and Muller & Dorfler.

Fifty-seventh St., n s, 175′ w Ninth Ave., one-st'y and basement brick church, slate roof; cost, $25,000; owner, John S. Davenport, 15 West Eleventh St., and another; architect, F. H. Kendall.

Forty-first St., s s, 275′ e First Ave., iron gasholder (tank); cost, $24,000; owner, Equitable Gas-Light Co., 340 Third Ave.; architect, John F. Harrison; builder, John T. Rowland.

Forty-eighth St., Nos. 328 *and* 330, 2 five-st'y brick tenements, tin roofs; cost, each, $17,000; owner, Alfred Brumme, 419 East Twenty-third St.; architect and builder, Wm. Stauffer.

West Forty-ninth St., No. 444, five-st'y brown-stone front tenement, tin roof; cost, $14,000; owner, Adelia Kirschhoffer, 444 West Forty-ninth St.; architect, Jobst Hoffmann.

West Fifty-fourth St., Nos. 431, 433, 435 *and* 437, 4 five-st'y brick tenements, tin roofs; cost, each, $16,000; owner, Philip Hauseman, 522 West Forty-ninth St.; architect, M. L. Ungrich.

Fifty-ninth St., s s, 240′ w Second Ave., 2 five-st'y brick tenements and stores, tin roofs; cost, each, $18,000; owner, John Murphy, 249 East Forty-ninth St.; architects, Thom & Wilson.

First Ave., w s, 75′ s Twenty-third St., five-st'y brick tenement and store, tin roof; cost, $17,500; owner, John Kreeb, 471 First Ave.; architects, Thom & Wilson.

Sixth Ave., Nos. 410 *and* 412, cor. Twenty-fifth St., five-st'y brick flat, tin roof; cost, $28,000; owner, Henry P. Stewart, White Plains, N. Y.; architect and builder, J. C. Miller.

Tenth Ave., n w cor. Thirty-seventh St., five-st'y brick tenement and store, tin roof; cost, $20,000; owner, John Schwarzler, 1365 Fifth Ave.; architects, Thom & Wilson; builders, days' work.

Tenth Ave., w s, 25′ n Thirty-seventh St., 2 five-st'y brick tenements and stores, tin roofs; cost, each, $18,000; owner and architects, same as last.

East Fifty-second St., No. 161, five-st'y brick tenement, tin roof; cost, $8,000; owner, architect and builder, Andrew T. Doyle, 211 East Fifty-eighth St.

Fifty-third St., foot of, and East River, two-st'y frame coal-pocket, tin roof; cost, $5,000; architect, D. W. King; builder, John Henry Euler.

Ninth Ave., n w cor. Forty-first St., five-st'y brick tenement and store, tin roof; cost, $15,000; owner, Mrs. Mary J. Gordon, 325 West Forty-sixth St.; architect, James Stroud.

One Hundred and Twenty-second St., n s, 150′ e Third Ave., 6 four-st'y brick tenements, tin roofs; cost, each, $12,000; owner and builder, Chas. E. Vantassel, 148 East One Hundred and Twenty-eighth St.; architect, J. H. Valentine.

Alterations.—*West Twenty-third St., No.* 67, two-st'y brick extension, etc.; cost, $10,000; owner, Chas. Kelly Briddon, on premises; architects, J. C. Cady & Co.

Madison Ave., n e cor. Thirtieth St., raise one-st'y, fire-proof; cost, $15,000; owners, Jno. S. Ellis, 139 Front St., and others; architects, Hubert Pirsson & Co.

East Seventy-eighth St., No. 119, general repairs; cost, $3,000; owner, Chas. Rosenbaum, 119 East Seventy-eighth St.; architects, Schwarzman & Buchmann; builder, W. Armstrong.

Cherry St., Nos. 305 *and* 307, raise two stories, etc.; cost, $7,000; owner, S. Ellis Briggs, 249 Cherry St.; builder, Alphonse Gariepy.

Thirty-third and Thirty-fourth Sts., foot of, and East River, one-st'y frame extension, gravel roof; cost, $4,000; owner, East River Ferry Co., on premises; architect, John Brandt.

Third and Fourth Aves. and Seventh and Eighth Sts., take out every alternate pier in first story on Third and Fourth Aves., and replace same by larger ones; cost, $30,000; owner, Cooper Union, Edward Cooper, President, 12 Washington Park; architect, Leopold Eidlitz; builder, Jas. B. Smith.

Washington St., No. 661, raise one-st'y and a five-st'y brick extension, tin roof; cost, $14,000; owner, James Roon, 278 West Tenth St.; architect, Jos. M. Dunn.

Wall St., Nos. 59 *and* 61, take out two cross-walls in first story and put in iron girders; cost, $6,000; owners, Brown Bros. & Co., on premises; architect, Charles W. Clinton; builder, John M. Dodd, Jr.

Philadelphia.

Building Permits.—*McKean St.*, w of Eleventh St., 3 two st'y dwells., 16′ x 43′; J. Stuckey, contractor.

School Lane, w of Morris St., three-st'y dwell., 32′ x 56′; Geo. Hearst, contractor.

North Twenty-fourth St., No. 760, three-st'y dwell., 17′ x 60′; Wm. Leavitt, contractor.

South Second St., No. 47, addition, 30′ x 35′; Marriner & Buckingham, contractors.

Twentieth St., below Reed St., 3 two-st'y dwells., 15′ x 40′; Wm. Forbes, contractor.

Fortieth St., n w cor. Ogden St., 8 three-st'y dwells., 15′ x 44′; also, 5 two-st'y dwells., 12′ x 30′; W. G. Kimball, contractor.

Second St., above Somersett St., 3 two-st'y dwells., 14′ 6″ x 45′; H. Bower, owner.

Bodine St., above Huntingdon St., one-st'y dye-house, 37′ x 50′; H. Shadwald.

Newbold St., above Wood St., addition to factory, 30′ x 45′; J. Eavenson & Son, owners.

Poplar St., above Fourth St., 2 three-st'y dwells., 15′ x 24′; W. Lehman, contractor.

Columbia Ave., above Twenty-seventh St., 2 three-st'y dwells., 15′ x 55′; J. E. Ridgway.

Thirty-eighth St., above Aspen St., 9 three-st'y dwells., 15′ x 50′; H. Pettit, owner.

Swayne St., w of Twenty-seventh St., 6 two-st'y dwells., 14′ x 34′; W. Charleton, owner.

Mechanic St., above Morton St., 8 two-st'y dwells., 14′ x 28′; D. P. Brunner.

Wharton St., w of Thirty-first St., 7 two-st'y dwells., 18′ x 46′; W. Thompson & Bro., contractors.

Woodland Ave., No. 481, three-st'y dwell., 18′ x 50′; John Welsh, owner.

Girard Ave., w of Twenty-ninth St., 25 two-st'y dwells., 16′ x 45′; Elkins & Co., owners.

Canal St., above St. John St., three-st'y factory, 20′ x 79′; W. H. Bilyen, contractor.

Chestnut St., Nos. 121, 133 *and* 125, 3 four-st'y stores, 28′ x 73′; I. A. Bradin, contractor.

Snyder Ave., w of Tenth St., 10 two-st'y dwells., 16′ x 43′; A. Miller, contractor.

Race St., No. 309, three st'y store, 20′ x 40′; Geo. D. Ellis & Sons.

Fifteenth St., above York St., 4 three-st'y dwells., 16′ x 56′; Jno. Holton, owner.

Summer St., w of Thirty-second St., 10 two-st'y dwells., 16′ x 45′; Wendell & Smith, owners.

Columbia Ave., w of Twenty-fifth St., 7 three-st'y dwells., 14′ x 55′; J. L. Carre, owner.

Vienna St., No. 1618, three-st'y dwell., 18′ x 42′; D. J. Getz, owner.

Elm Ave., No. 4120, 4 three-st'y dwells., 20′ x 56′; H. Grau, contractor.

Knox St., above Manheim St., two-st'y dwell., 18′ x 54′; B. F. Evans, contractor.

Montrose St., w of Sixteenth St., 2 two-st'y dwells., 17′ x 28′; W. Crawford, contractor.

Thirty-eighth St., cor. Locust St., 6 three-st'y dwells., 20′ x 55′; A. B. Rorke, contractor.

Girard College Grounds, one-st'y shop, 30′ x 66′; A. B. Rorke, contractor.

Wharton St., w of Fifteenth St., four-st'y factory, 53′ x 103′; A. Beck, contractor.

Marston St., above Columbia Ave., 8 two-st'y dwells., 15′ x 39′; J. E. Ridgway, owner.

Clearfield St., No. 320, two-st'y dwell., 16′ x 38′; E. L. Baldt, owner.

Emerald St., cor. Alleghany Ave., three-st'y dwell., 20′ x 60′; Jno. Baldt & Son.

Brown St., w of Thirty-ninth St., 22 three-st'y dwells., 16′ x 55′; T. L. Michaelson, contractor.

St. Louis.

Building Permits.—Seventy-one permits have been issued since our last report, fourteen of which are for unimportant frame houses. Of the rest those worth $2,500 and over are as follows:—

R. W. Crittenden, one-st'y brick livery stable, cost, $4,987; P. W. Hassett, contractor.

Wm. Danwalter, two-st'y brick store; cost, $2,800; E. C. Jaussen, architect; Phil Riechers, contractor.

Miss Maria Patterson, two-st'y brick laundry; cost, $6,000; D. Sullivan, contractor.

D. B. Brennan, two-st'y brick dwell.; cost, $2,700; T. W. Brady, architect; John Wesling, contractor.

Wm. F. Grace, two-st'y brick dwell.; cost, $2,550; T. W. Brady, architect; John Wesling; contractor.

J. Eberle, one-st'y boarding stable; cost, $3,000; F. Mueller, contractor.

Wm. Giester, two-st'y double brick dwell.; cost, $4,500; A. Beinke & Co., architects; J. Ratz, contractor.

Daniel Myers, two-st'y store and dwell.; cost, $2,800; Wm. Haekenhoff & Bro., contractors.

C. Riese, two-st'y double brick tenements; cost, $4,400; H. W. Rocklage, contractor.

W. D. Grant, two-st'y double brick dwell.; cost, $3,000; J. H. McNamara, architect; W. D. Barter, contractor.

M. Grunds, two-st'y double brick tenement; cost, $2,500.

B. Biermann, two-st'y double brick store and rooms above; cost, $5,000; B. J. Gosse, architect; Gosse & Remmers, contractors.

John Davis, 2 adjacent two-st'y double brick tenements; cost, $4,500; Herman & Schumacher, contractors.

Wm. M. Harton, 2 two-st'y double brick dwells.; cost, $12,000; J. Flannery & Bro., contractors.

Louis Marko, 5 adjacent two-st'y brick tenements; cost, $6,000; O. Koenig, architect; D. Fangman, contractor.

Dr. C. S. Carriere, two-st'y double brick dwell.; cost, $5,000; H. Dries, contractor.

A. Rombach, two-st'y double brick dwell.; cost, $5,500; E. C. Jaussen, architect; W. C. Popp, contractor.

P. Herney, two-st'y double brick tenement; cost, $3,000; sub-let.

Wm. Maxwell, two-st'y brick dwell.; cost; $2,500; B. J. Gosse, architect; W. Paul, contractor.

P. Reagan, two-st'y brick dwell.; cost, $2,500; John Castello, contractor.

M. J. Sarazin, two-st'y double brick dwell.; cost, $2,500; T. H. Terrence, architect; F. H. Goss, contractor.

Mrs. J. Nast, two-st'y brick dwell.; cost, $3,000; Jacob Ratz, contractor.

Mrs. Rosemeyer, two-st'y double brick tenement; cost, $2,800; V. Beckerle, contractor.

Fred Auer, two-st'y double brick dwells.; cost, $4,000; G. Boettinger, contractor.

St. Paul, Minn.

Building Permits.—Two-st'y brick addition to school-house, e s of Western Ave., bet. Banfil and Goodhue Sts.; cost, $9,103; owner, Board of Education.

Two-st'y frame double dwell., s s of Twelfth St., bet. Pine and Broadway Sts.; cost, $11,500; owner, C. H. Ilner.

Three-st'y brick dwell., n s of Sixth St., bet. Exchange and Market Sts.; cost, $6,000; owner, J. F. Will.

Two-st'y frame dwell., w s of De Sota St., bet. Collins and Hopkins Sts.; cost, $2,535; owner, Wm. M. Becker.

Two-st'y frame dwell., s s of Chicago Ave., bet. Hyde St. and Dakota Ave.; cost, $2,000; owner, J. B. Farwell.

Four-st'y brick business block, n s of Fifth St., bet. Minnesota and Cedar Sts.; cost, $13,000; owner, E. F. Berrieford.

Two-st'y frame double dwell., w s of Broadway, bet. Fourteenth and Fifteenth Sts.; cost, $5,000; owner, Wm. Troy.

Two-st'y brick block, stores and dwells., n s of Seventh St., bet. Kittson and Neill Sts.; cost, $7,000; owner, Mrs. Braden.

Three-st'y brick block stores and dwell., n s of West Seventh St., bet. Walnut and Sherman Sts.; cost, $14,000; owner, Wm. G. Robertson.

Two-st'y brick veneer store and dwell., w s of Oakland Ave., bet. Annapolis and Wyoming Sts.; cost, $2,000; owner, Lizzie M. Vandervoort.

Two-st'y frame store and dwell., e s of Burr St., bet. Janks and Case Sts.; cost, $2,490; owner, Geo. F. Woolsey.

Addition to stone brewery, s s of Ohio St., bet. Isabel and Bellows St.; cost, $2,000; owner, A. Yoero.

Two-st'y frame dwell., s s of Marion St., bet. Wilder and Moore Sts.; cost, $4,000; owner, A. S. Martin.

Three-st'y frame vinegar factory, w s of State St., bet. Wright St. and the Creek; cost, $4,000; owner, Paul Martin.

Two-st'y brick barn, n s of West Fifth St., bet. Wabasha and St. Peter Sts.; cost, $4,235; owner, Mrs. Sarah Hall.

One-st'y brick purifying house, n s of East Fourth St., bet. John and Olive Sts.; cost, $3,500; owner, Add. J. Atkinson.

Two-st'y brick dwell., e s of Mississippi St., bet. Nash and Somerset St.; cost, $2,300; owner, John E. O'Brien.